

### III. IMPLEMENTING THE PLAN

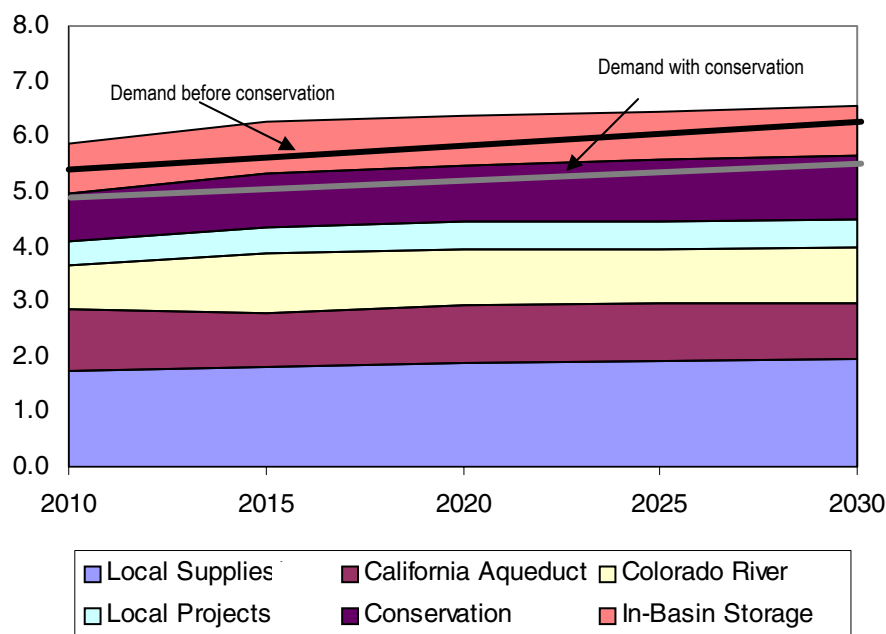
The reliability evaluation conducted as part of the 1996 IRP revealed that without future investments in local and imported supplies, the region could experience a supply shortage of at least 0.79 million acre feet about 50 percent of the time (or once every other year) by 2020. Since that time Metropolitan, its member agencies, and other local agencies have worked to implement the goals identified in the IRP. The IRP Update demonstrated that these efforts have moved the region toward its goal of long-term regional water supply reliability.

Metropolitan has worked in many different areas to bring about this improved supply reliability. The major drivers have been:

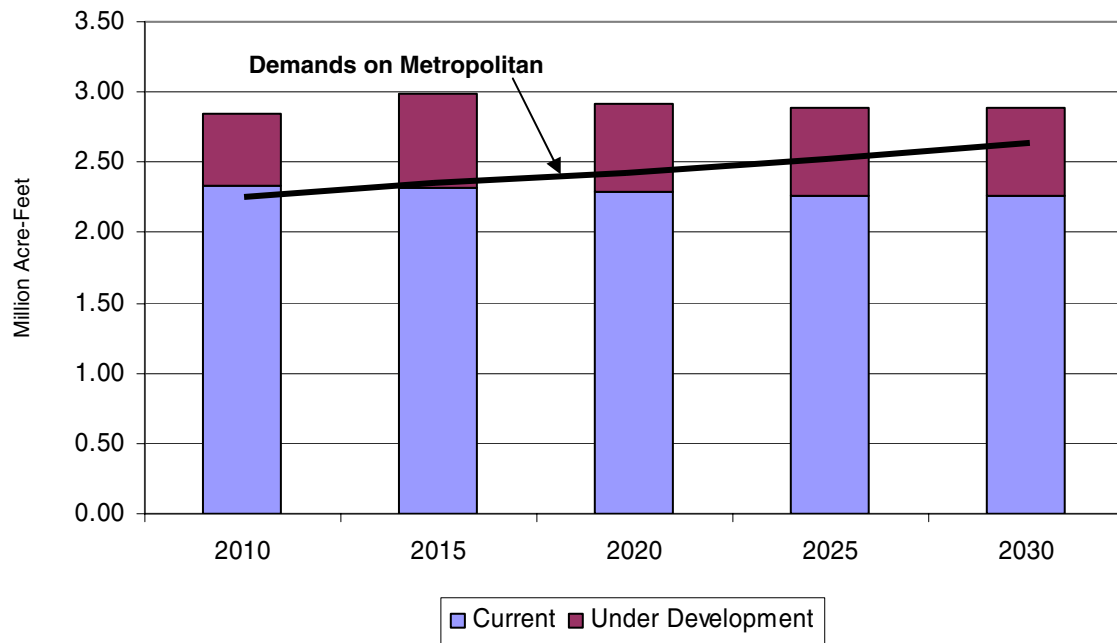
- conservation
- water recycling and groundwater recovery
- storage and groundwater management programs within the Southern California region
- storage programs related to the State Water Project (SWP) and the Colorado River
- other water supply management programs outside of the region.

Many of these programs are already successfully implemented. Others, including institutional and facility changes in the Colorado River region and the SWP, will take more time to execute. Figure III-1 shows the expected ability to meet demands in future single dry years by water supply source. Figure III-2 separately identifies those supplies that are expected from already existing agreements and contracts, and those still to be developed, and Table III-1 provides the details behind this figure. The following sections discuss each of these programs, relating the successes to date and the programs that are still under way.

**Figure III-1**  
**Dry-Year Demand and Supplies**



**Figure III-2**  
**Single Dry Year Supply Capability**



**Table III-1**  
**Single Dry-year Supply Capability<sup>1</sup> & Projected Demands**  
 (Repeat of 1977 Hydrology)  
 (acre-feet per year)

	2010	2015	2020	2025	2030
<b>Current Supplies</b>					
Colorado River Aqueduct <sup>2</sup>	722,000	699,000	699,000	699,000	699,000
California Aqueduct <sup>3</sup>	777,000	777,000	777,000	777,000	777,000
In-Basin Storage	840,000	838,000	808,000	784,000	784,000
<b>Supplies Under Development</b>					
Colorado River Aqueduct	95,000	460,000	400,000	400,000	400,000
California Aqueduct	330,000	259,000	350,500	350,000	350,000
In-Basin Storage	78,000	103,000	103,000	103,000	103,000
<b>Transfers to Other Agencies</b>	0	(35,000)	(35,000)	(35,000)	(35,000)
<i>Metropolitan Supply Capability</i>	<i>2,842,000</i>	<i>3,101,000</i>	<i>3,102,000</i>	<i>3,078,000</i>	<i>3,078,000</i>
<i>Metropolitan Supply Capability w/CRA Maximum of 1.25 MAF<sup>4</sup></i>	<i>2,842,000</i>	<i>3,033,000</i>	<i>3,002,000</i>	<i>2,970,000</i>	<i>2,970,000</i>
<i>Firm Demands on Metropolitan<sup>5,6</sup></i>	<i>2,293,000</i>	<i>2,301,000</i>	<i>2,234,000</i>	<i>2,363,000</i>	<i>2,489,000</i>
<b>Potential Reserve &amp; Replenishment Supplies</b>	<b>549,000</b>	<b>732,000</b>	<b>768,000</b>	<b>608,000</b>	<b>481,000</b>

<sup>1</sup> Represents supply capability for resource programs under listed year type.

<sup>2</sup> Colorado River Aqueduct includes water management program supplies conveyed by the aqueduct

<sup>3</sup> California Aqueduct includes Central Valley transfers and storage program supplies conveyed by the aqueduct

<sup>4</sup> Maximum CRA deliveries limited to 1.25 MAF including SDCWA/IID Transfer supplies and Coachella and All-American Canals lining supplies.

<sup>5</sup> Based on SCAG 2004 RTP, SANDAG 2030 forecasts, projections of member agency existing and contracted active conservation and local supplies, remaining regional targets for active conservation and local supplies, SDCWA/IID Transfer supplies and Coachella and All-American Canals lining supplies.

<sup>6</sup> Includes projected firm sales plus 70% of projected IAWP agricultural sales

### **III.1 Existing / Developed Local Supplies**

Approximately 50 percent of the regional water supplies come from resources controlled or operated by local water agencies. These resources include water extracted from local groundwater basins, catchment of local surface water, and non-Metropolitan imported water supplied through the Los Angeles Aqueduct and the Colorado River Aqueduct.

#### **Groundwater**

The groundwater basins that underlie the region provide approximately 90 percent of the local water supply in Southern California. The major groundwater basins in the region provide an annual average supply of approximately 1.36 million acre-feet. Most of this water recharges naturally, but approximately 200 taf is replenished through imported supplies. By 2025, estimates show that groundwater production will increase to 1.42 million acre-feet.

Because the groundwater basins contain a large volume of stored water, it is possible to produce more than the natural recharge of 1.16 million acre feet and the replenishment amount for short periods of time. During a dry year, replenishment deliveries can be postponed, but doing so requires that the shortfall be restored in wet years. Similarly, in dry years the level of the groundwater basins can be drawn down, as long as the balance is restored to the natural recharge level by increasing replenishment in wet years. Thus, the groundwater basins can act as a water bank, allowing deposits in wet years and withdrawals in dry years.

#### **Surface Water**

In addition to the groundwater basins, local agencies maintain surface reservoir capacity to capture local runoff. The annual average yield captured from local watersheds is estimated to average approximately 100 taf per year. The majority of this supply comes from reservoirs within the service area of San Diego County Water Authority.

#### **Los Angeles Aqueduct**

Although the Los Angeles Aqueduct (LAA) imports water from outside the region, water provided by the LAA is still classified as a local resource by Metropolitan because it is developed and imported by a local agency (the Los Angeles Department of Water and Power). This resource is estimated to provide approximately 250 taf per year on average, which may be reduced to approximately 96 taf during a historical dry period.

#### **IID/San Diego County Water Authority Transfer**

The San Diego County Water Authority (SDCWA) has executed an agreement with the Imperial Irrigation District (IID) under which IID will transfer to SDCWA. The transfer began in 2003 with 10 taf made available to SDCWA in that year. The transfer volumes will increase in accordance with an annual build-up schedule, reaching 100 taf annually by 2013 and stabilizing at 200 taf annually in 2023. Currently, the water is being conserved through land fallowing arrangements made by IID with its customers. Beginning in 2013, IID will begin replacing land fallowing with irrigation efficiency measures that will allow farming operations

to continue with reduced amounts of applied water. By 2017 all of the transferred water should be made available through irrigation and distribution system efficiency measures. The water transferred by IID is made available by SDCWA to Metropolitan for diversion at Lake Havasu. Metropolitan provides a matching volume of water to SDCWA by exchange.

### **Coachella and All-American Canal Lining Projects**

The Coachella Canal Lining Project consists of building a new 33-mile concrete-lined canal, including the construction of new siphons, to replace 34 miles of an existing earthen canal which results in water conveyance losses due to seepage. Project construction began in 2004 and is scheduled to be completed in January 2007. The project is expected to conserve 26 taf annually.

The all-American Canal Lining Project consists of replacing 23 miles of earthen canal with a concrete-lined canal constructed parallel to the existing canal. It is scheduled to begin in 2005 and to be completed in the fall of 2008. This project is expected to conserve 67.7 taf annually.

Costs to construct these projects are to be advanced by the SDCWA and reimbursed with state funds. Pursuant to the QSA and related agreements, the total 93.7 taf of annual yield from these projects will be allocated as follows:

- 16 taf will be allocated to the San Luis Rey Settlement Parties in San Diego County to resolve a long-standing Indian water rights dispute;
- the remaining 77.7 taf will be allocated to SDCWA.

The conserved water will be made available at Lake Havasu for diversion by Metropolitan, and by exchange, Metropolitan will deliver the respective volumes of water to the San Luis Rey Settlement Parties and SDCWA. The San Luis Rey Settlement Parties currently have no developed demands for their share of the water, so it is expected that this water will be sold to neighboring communities within San Diego County, thus diminishing the county's demand for water from Metropolitan. For this reason, the full 93.7 taf is shown as being delivered to Metropolitan's service territory.

Table III-2 provides an estimate of these supplies in average and dry years.

**Table III-2**  
**Local Supplies\***  
**(Thousand Acre Feet)**

	2010		2025		2030	
	Average Year	Dry Year	Average Year	Dry Year	Average Year	Dry Year
Local Groundwater						
From Natural Recharge	1,160.0	1,160.0	1,160.0	1,160.0	1,160.0	1,160.0
Replenishment	256.0	214.6	283.5	251.7	282.3	270.3
Local Runoff Stored	100.0	93.3	99.2	93.5	98.6	93.5
Los Angeles Aqueduct	252.5	95.5	253.2	95.3	253.6	95.3
IID/SDCWA Transfer	70.0	70.0	200.0	200.0	200.0	200.0
Coachella & All American Canal Lining	93.7	93.7	93.7	93.7	93.7	93.7
<b>Total</b>	<b>1932.2</b>	<b>1727.1</b>	<b>2089.6</b>	<b>1894.2</b>	<b>2088.2</b>	<b>1912.8</b>

\* Does not include local projects such as groundwater recovery, recycling and desalination, which are discussed in Section III-3.

## III.2 Conservation

Conservation is a core element of Metropolitan's long-term water management strategy. From 1992 through the end of FY 2004, Metropolitan has invested more than \$213 million in conservation-related programs within the region.<sup>1</sup> Among other measures, this investment has resulted in the retrofit of more than 2.3 million toilets with ultra-low flow models (ULFTs) and distribution of more than 93,000 high efficiency clothes washers (HECWs). Collectively, Metropolitan's conservation programs and other conservation in the region will reduce Southern California's reliance on imported water by more than 1 million acre-feet per year by 2025.

Metropolitan's conservation policies and practices are shaped largely by two factors: Metropolitan's IRP and the California Urban Water Conservation Council *Memorandum of Understanding Regarding Water Conservation in California* (MOU). As a signatory to the MOU, Metropolitan has pledged to make a good faith attempt to implement a prescribed set of urban water conservation Best Management Practices (BMPs). Many of Metropolitan's conservation programs exceed BMP requirements.

### IRP Goals

Metropolitan's IRP places equal emphasis on local and imported resource development. The IRP treats conservation as a core local supply, on par with other resources such as water recycling and storage. As described in the IRP, conservation savings result from both "active" and "code-based" conservation efforts. "Active" conservation consists of water-agency funded programs such as rebates, installations, and education. "Code-based" conservation, formerly described as "passive" conservation, consists of demand reductions attributable to conservation-oriented plumbing codes and usage reductions resulting from increases in the price of water. Code-based conservation occurs without direct agency action targeted at conservation. Including regional pre-1990 conservation savings, Metropolitan's 2025 IRP total conservation target is approximately 1.1 million acre-feet per year. A large share of the target has already been achieved through existing Metropolitan and member agency programs, pre-1990 savings, price effects, and continued savings that accrue from plumbing codes. The remainder is expected to be achieved through additional agency-sponsored active conservation programs, plumbing code changes, and price effects.

### Issues

Unlike traditional water supplies, conservation reduces water demand in ways that must be quantified indirectly. Demand is reduced through changes in consumer behavior and savings from water-efficient fixtures like ultra-low-flow toilets and showerheads. Quantifying and projecting conservation savings requires specially designed estimating models. Such models were used for both the 1996 IRP targets and IRP Update projections.

Conservation savings are commonly estimated from a base-year water-use profile. Metropolitan uses 1980 as the base year because the start of that year marked the effective date of a new plumbing code in California requiring toilets in new construction be rated at 3.5 gallons per flush

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<sup>1</sup> Conservation achievements cited in this section are as of the end of FY 2004 unless otherwise noted.

or less. Between 1980 and 1990, the region saved an estimated 250,000 acre-feet per year as the result of this 1980 plumbing code and unrelated water rate increases. These savings are referred to as “pre-1990 savings.” The 1996 IRP target combines pre-1990 savings and estimates of more recently achieved savings.

Distinguishing between active and code-based conservation can be analytically complex when, for example, active programs for fixtures are concurrent with conservation-related plumbing codes. This plan combines active and code-based conservation savings using methods that avoid double counting.

Metropolitan does not currently assign a savings value for public awareness campaigns and conservation education because any initial effect on demand reduction and the longevity of the effect are hard to measure. It is generally accepted that these programs prompt consumers to install water saving fixtures and, therefore, that they have a residual benefit of increasing the effectiveness of companion conservation programs.

### **Changed Conditions**

Since the publication of the last Regional Urban Water Management Plan in 2000, two significant implementation successes are important to note. Both the achieved regional conservation savings and the member agencies’ plans for increased local supply development have been greater than expected.

A more complete list of changes to the conservation projections in the IRP Update include the following changes in data and methods:

1. New demographic projections
2. New water savings estimates for high-efficiency fixtures
3. New projections of active conservation
4. Explicit handling of price-effect savings
5. Explicit differentiation between active and code-based savings.

The net effect of these changes is a higher projected level of conservation savings.

### **Implementation Approach**

Metropolitan’s implementation approach for achieving the revised conservation target includes support to member agencies in developing cost-effective BMP-oriented active conservation programs and in developing new, innovative programs that address regional water uses. Metropolitan’s rate structure stewardship charge provides a funding mechanism for active programs. Metropolitan will continue to seek state and federal funding in coordination with the member agencies.

### ***Implementation of Conservation “Best Management Practices”***

These agency-sponsored programs are closely linked to the efforts of the California Urban Water Conservation Council (CUWCC)—the organization created to administer the Urban MOU. As a

signatory to the CUWCC's Urban MOU, Metropolitan has pledged to make a good faith effort to implement a prescribed set of urban water conservation BMPs. Metropolitan provides technical and financial support needed by member agencies in meeting the terms of the Urban MOU. Table III-3 provides a list of the BMPs and compares how they apply to Metropolitan, which is a water wholesaler, versus retail water agencies. An enclosed CD contains copies of Metropolitan's BMP reports filed with the CUWCC.

In addition to implementing cost-effective BMPs, Metropolitan actively supports many program committee activities run by the CUWCC. For example, Metropolitan has historically provided staff time and financial resources in support of CUWCC's ongoing efforts to document and increase the effectiveness of BMP-related conservation efforts. Metropolitan staff members participate in several CUWCC governing committees. Metropolitan frequently supports CUWCC research studies. Presently, Metropolitan is represented on the following CUWCC committees:

- Steering Committee
- AB2717 Landscape Committee
- Commercial, Industrial, and Institutional Committee
- Residential Committee
- Landscape Committee
- Research and Evaluation Committee
- PBMP Subcommittee (Potential BMPs)

**Table III-3**  
**Urban Water Conservation Best Management Practices**

BMP Number	BMP Description	Applies to	
		Retailers	Wholesalers
1	Residential Water Surveys	Yes	No
2	Residential Plumbing Retrofits	Yes	No
3	System Water Audits, Leak Detection	Yes	<b>Yes</b>
4	Metering and Commodity Rates	Yes	No
5	Large Landscape Audits	Yes	No
6	High Efficiency Washing Machines	Yes	No
7	Public Information	Yes	<b>Yes</b>
8	School Education	Yes	<b>Yes</b>
9	Commercial, Industrial, & Institutional	Yes	No
10	Wholesale Agency Assistance	No	<b>Yes</b>
11	Conservation Pricing	Yes	<b>Yes</b>
12	Conservation Coordinator	Yes	<b>Yes</b>
13	Water Waste Prohibition	Yes	No
14	Residential ULFT Replacements	Yes	No

The following sections describe Metropolitan's conservation programs.

### ***Conservation Credits Program***

Metropolitan's Conservation Credits Program (CCP) provides the basis for financial incentives and funding for urban BMP and other demand management related activities. Established in 1988, this funding mechanism supports Metropolitan's commitment to conservation as a long-term water management strategy.

The basis of Metropolitan financial support to member agency conservation efforts is estimated as the lesser of \$154 per acre-foot of water saved or one-half of the program cost. In general, CCP funded water conservation project proposals must:

- Have demonstrable water savings;
- Reduce water demands on Metropolitan's system; and
- Be technically sound and require Metropolitan's participation to make the project financially and economically feasible.

### ***The Regional Supply Unit***

Metropolitan staff is responsible for developing and administering Metropolitan's water conservation policies and programs. Approximately 10 people focus their efforts on water conservation issues. Staff members serve as the primary liaisons to Metropolitan's member agencies and other pertinent agencies and organizations.

Metropolitan's conservation programs focus on three main areas: residential indoor programs, landscape programs, and commercial, industrial and institutional programs.

### ***Residential Programs***

The residential conservation programs consist of ultra-low-flush toilets (ULFT), high efficiency clothes washers (HECW), and water-use efficiency surveys (Surveys). Metropolitan extended funding to include installing conserving devices that exceed standards in new development.

#### **Ultra-Low-Flush Toilet (ULFT) Program**

This program addresses BMP 14: conserving water by replacing older, high water using toilets (3.5 gallons-per-flush and greater) with 1.6 gallons per flush ULFTs. Metropolitan began co-funding member agency-managed ULFT programs in 1988, and to date, 25 of Metropolitan's 26 member agencies have conducted ULFT programs. This activity is the largest of Metropolitan's conservation programs. Metropolitan funds ULFT retrofit programs at \$60 per ULFT installed. In August 2002, Metropolitan began funding dual-flush toilets at \$80 per unit installed. These toilets exceed the current standard of 1.6 gallons per flush and, thus, have higher water savings than ULFTs.

ULFT programs are implemented through rebates or distributions. Rebate programs allow customers to purchase their choice of ULFT. Distribution programs provide ULFTs to customers at little or no charge. Rebates and vouchers typically range in value from \$60 to \$75, depending on the managing water agency's policy. In both the rebate and voucher programs, the customer is responsible for disposing of the old toilet.

Table III-4 shows the total cumulative savings from ULFT toilets, including all previous installations. In FY 2003-04, the estimated savings were 81 taf per year, translating into a lifetime savings exceeding 1.6 million af.

**Table III-4**  
**ULFT Installation and Savings History**

Calendar Year	Annual Installs	Cumulative Installs	Accumulated ULFT Savings (Acre-Feet)	
	Number of ULFTs	Number of ULFTs	Annual Savings	Lifetime Savings
Pre-1999		1,310,354	45,556	911,116
1999	189,294	1,499,648	52,131	1,042,620
2000	197,214	1,696,862	58,968	1,179,360
2001	105,324	1,802,186	62,595	1,251,899
2002	258,403	2,060,589	71,515	1,430,298
2003	159,559	2,220,148	76,994	1,539,872
2004	130,180	2,350,328	81,491	1,629,820

#### High Efficiency Clothes Washer Rebate Program

The installation of high-efficiency clothes washers (HECWs) is a growing segment in water conservation. In September 1997, the California Urban Water Conservation Council adopted BMP 6 for HECWs, and it approved revisions in March 2004. The revisions contain two options for how to credit agencies. The first option is based on the washer's "water factor" (WF), which is a measure of the amount of water used to wash a standard load of laundry. Washers with lower water factors save more water. The first option awards 1 point for HECWs with water factors 9.5 through 8.6; 2 points for WF 8.5 through 6.1; and 3 points for WF 6 and less. It does not award points for HECWs with water factors greater than 9.5. The second method grants 1 point for all washers regardless of the water factor.

Metropolitan supported the passage of California legislation requiring all washers sold in the state to meet an 8.5 water factor standard by 2007 and a 6.0 water factor standard by 2010. Since these standards exceed federal standards, the California Energy Commission (CEC) is preparing a waiver request to submit to the U.S. Department of Energy (DOE) that will allow California to promulgate a standard that is more stringent than federal standards. Two or three years may elapse before DOE responds.

Regardless of the outcome of the waiver request to DOE, Metropolitan continues to promote HECWs. As of the end of FY 2004, Metropolitan has provided incentives to purchase over 93,000 washers. From 1995 through October 2004, Metropolitan offered a \$35 per washer incentive. From 1999 to 2001, Metropolitan partnered with Southern California Edison, which added an additional incentive of \$50-\$100. In 2002, Metropolitan received a grant from CALFED for an additional \$90 per HECW, which brought the total Metropolitan incentive to \$125 per washer. During the span of this grant, participation in the program increased from an average of 4,000 units per year to 20,000 units per year. At the close of that grant Metropolitan

provided a temporary increase in its own funding to \$110 per HECW, and in 2004, it received a Proposition 13 grant for the additional \$75 per HECW, so the total incentive remained at \$110 per washer. In November 2004, Metropolitan's increased its HECW base incentive to \$60 for washers with minimum water savings of 9,000 gallons per year. Grant funds were exhausted by June 2005, and Metropolitan has provided bridge funding until supplemental funds from Proposition 50 are available.

#### New Development Program

Metropolitan recently adopted incentives for new developments to install highly efficient fixtures that exceed current water use efficiency standards. Other opportunities to promote the installation of water-efficient devices in new developments will be explored with manufacturers, the building industry, and stakeholders.

#### Residential outdoor audit program

Metropolitan funds a residential landscape efficiency program through outdoor audits and weather-based irrigation controller rebates. Landscape audits provide customers with a recommended irrigation schedule and suggested improvements for irrigation systems. Installation of weather-based irrigation controllers (WBICs) is supported through the coordinated rebate program described below

#### Residential Weather-Based Irrigation Controller (WBIC) Rebate

Weather-based irrigation controllers are a rapidly evolving conservation technology. It entails devices that adjust irrigation schedules based on rain, temperature, sunlight, soil moisture, or some combination of indicators. Metropolitan began funding WBIC incentives in homes after conducting a pilot study that evaluated potential savings and ease of use. The incentive is \$65 per WBIC, plus \$5.50 per station over 12 stations for residential sites

#### ***Non-Residential Landscape Water Use Efficiency Program***

Metropolitan has funded large landscape audits since 1993, retrofit of landscapes with centralized irrigation controllers since 1998, and rebates for weather-based irrigation controllers (WBIC) since 2002.

In September 2004, Metropolitan began an updated large landscape program. The new program provides Metropolitan's member agencies with the flexibility to choose from three components that best fit specific landscape sites. The long-standing landscape training program – Professional Protector del Agua – supports the first two of these three components:

1. Water Use Accountability
2. Measured Water Savings
3. Commercial and Institutional WBIC rebates

1. Water Use Accountability. This program improves landscape water management practices through training and timely water use reports. Agencies provide landscape owners, managers, and maintenance personnel with reports that compare the actual site water use to water budgets. Each billing cycle, the agencies generate water use update reports. In addition, participants may receive landscape water management training either by

Metropolitan or the agency. Metropolitan provides incentives to reimburse agencies for up to 50% of their program costs. Incentives are \$2.50 per acre per month of irrigated landscape under management if Metropolitan provides the training, or \$3.50 per acre per month if the agency provides the training.

2. Measured Water Savings: Metropolitan provides incentives to upgrade landscape irrigation equipment that can provide verified water savings. In addition, participants may receive landscape water management training. A dedicated landscape meter is required to participate in this pay-for-performance program component. Incentives are \$115 per acre-foot of verified saving if Metropolitan provides the training, and \$154 per acre-foot if the agency provides the training. The incentives continue to be paid for up to five years or one-half of the project cost.

3. Commercial and institutional WBIC Rebate: Metropolitan provides an incentive of \$500 per acre of irrigated landscape for WBICs.

#### Professional Protector del Agua (PPDA)

Metropolitan provides classes on efficient landscape water management. Agencies can provide equivalent training via their own staff or program vendor to meet the program requirements. An agency needs to choose whether Metropolitan or the agency will be providing PPDA training or the equivalent at the outset of their program.

#### Southern California Heritage Landscape Program

In 2002, Metropolitan launched a public outreach campaign targeting outdoor water use. The campaign, coordinated with participating member agencies, included funding for the promotion of efficient residential watering through irrigation controllers, a watering index to assist in estimating efficient watering times, and a native and California-friendly plant program. Metropolitan expanded these programs in 2003 and 2004 with an extensive media and outreach campaign and launched a consumer-oriented outdoor conservation savings web site.

The landscape program is expected to reduce summer and fall outdoor water use. The actual savings rate will be measured, but will not be included in the IRP Update's resource goals. Quantifying the potential savings is complicated because of possible overlaps with other programs – some of the outdoor savings, when measured, may be confounded with price-induced savings unless the effort is preceded by a controlled evaluation study.

#### ***Commercial, Industrial and Institutional Programs***

Prior to the establishment of the Commercial, Industrial, and Institutional (CII) rebate program in 1997, Metropolitan conducted approximately 900 (CII) water-use surveys. These surveys provided the initial information used to determine the menu of eligible rebates and their dollar amounts, as shown in Table III-5.

**Table III-5  
CII Rebates Offered**

<b>Device</b>	<b>Incentive Amount</b>
ULFT (Gravity & Flush Valve)	\$60
Dual-flush toilet	\$80
Upgrade from ULFT to dual-flush	\$20
Urinal	\$60
Pre-Rinse Spray Valve	\$50
HECW	\$100
Water broom	\$100
Cooling Tower Controller	\$500
X-Ray Film Processor Recirculating System	\$2,000

In 1999, Metropolitan partnered with its member agencies to pilot the feasibility of working with a regional vendor for program marketing, management, and paying of rebate checks. Based on the success of this pilot program, a vendor-administered regional program began in 2004. Member agencies wishing to manage their own commercial program remain eligible to receive the device incentives listed above.

#### Industrial Process Improvement Program

Metropolitan's Industrial Process Improvement (IPI) program provides incentives to industrial customers for improving the water efficiency of their processes. Metropolitan has offered incentives to industrial customers since 1997. Initially, the complexity of the program and the difficulty in sector marketing resulted in low participation rates. In 2004, Metropolitan conducted focus groups to gather ideas for improving the IPI program. The resulting improvements – that encourage water efficiency actions by individual operators within their facilities – include:

- a) Partial payment of the conservation incentive up front
- b) Streamlining the application process
- c) Providing outside vendor services for technical advice
- d) Eliminating limits on project size.

Additionally, Metropolitan has initiated partnering opportunities with local sanitation districts to help market the program.

### Innovative Conservation Program

Metropolitan's Innovative Conservation Program (ICP) began in October 2001 with a request for proposals for new conservation technologies. The 2001 ICP identified two promising new technologies: X-ray film processing water recyclers and water brooms. These two technologies have been added to Metropolitan's existing programs. In 2003, Metropolitan issued a second ICP request for proposals that resulted in the following ICP grants:

- An evaluation of water savings potential of commercial connectionless food steamers;
- An evaluation of the effectiveness of water savings with instant hot water systems;
- An artificial lawn demonstration test project;
- A swimming pool cover rebate survey;
- Research on surfactants that optimize water usage in turf and ornamentals;
- A native- and drought-tolerant plant pilot incentive program;
- A study of the efficiency of closed loop irrigation controls;
- A study of water conservation opportunities in supermarkets;
- A flow control valve study; and
- Root scorch prevention of container-grown California native plants sold in the retail trade.

These projects are all in various stages of completion.

### ***Price-Effect Conservation***

Numerous demand studies have shown that retail water rates and rate structures can be effective in promoting water savings. Consumers respond to price increases by reducing discretionary water use and by installing water-conserving devices. As retail rates within the region increase, and as water agencies adopt conservation-oriented rate structures, Metropolitan expects discretionary household and commercial and industrial water use to decrease. This reduction was modeled and incorporated into the IRP Update as a source of conservation. Most of the savings are expected to come from reductions in outdoor irrigation, which is the major discretionary component of residential and commercial use.

### ***Grant Programs***

Additional funding for conservation programs has been made available through government agencies. Metropolitan has worked to obtain a share of this funding to enhance the region's water conservation investments. Table III-6 and the following summaries describe briefly the sources and uses of these funds.

**Table III-6  
Grant Program Funding**

Funding Source	Program/Project	Funding Amount (\$1,000s)	Description	Status
<b>CALFED</b>				
	Residential HECW	\$925	Increase rebate amount	Completed
	Protector del Agua	\$100	Course development	Completed
	CII	\$34		
<b>Prop 13 Grants</b>				
	HECW	\$2,500	Increase rebate amount	
	ET Controllers	\$1,800	Initiate rebates	
<b>CPUC (w/CUWCC)</b>				
2003	Pre-Rinse Spray Valves: Phase 1	\$1,600*	12,000 direct installations*	Completed
2004	Pre-Rinse Spray Valves: Phase 2	\$2,200*	17,000 direct installations*	In progress
<b>USBR</b>				
2003	CA-Friendly Landscapes	\$182	New home landscapes	
2003	Data Loggers	\$50	Software error analysis	Deferred
2004	CA-Friendly Landscapes	\$60	New home landscapes	
2004	Synthetic Turf pilot	\$220		In progress
2004	World Forum	\$50	College/university grants	In progress
2004	CII Regionwide	\$250	Add \$ to rebate amounts and for administration	Completed
2005	Protector del Agua	\$50	Develop web classes	Pending
2005	Landscape Market Analysis	\$50		Pending
2005	City Makeover	\$50	Public landscapes	In progress
<b>Water for the West</b>				
	Protector del Agua	\$25	Develop web classes	In progress
<b>Prop 50</b>				
	Residential HECW	\$1,660	Increase rebate amount	Pending
	CA-Friendly Cities	\$423	Public landscapes	Pending
	High Efficiency Toilets	\$1,000		Pending
	Protector del Agua	\$77.5	Develop on-line classes	Pending

\* This amount is Metropolitan's share of the project.

### CALFED

- Residential High Efficiency Clothes Washers funded at \$925,000
- Protector del Agua funded at \$100,000
- CII conservation (\$34,000)

### Proposition 13-Funded Grants

Proposition 13 (The Safe Drinking, Clean Water, Watershed Protection, and Flood Protection Act) provided funding for water conservation. Within Metropolitan's region, grant funds received in 2003 went toward the following programs:

- Residential High Efficiency Clothes Washer Rebate Program – \$ 2.5 million – used to extend the rebate program for high-efficiency clothes washers for about a year at the rebate level of \$110 per unit.
- Evapotranspiration (ET) Irrigation Controller Installation Rebate – \$ 1.8 million – used to establish a new rebate program that will install 5,500 units and perform studies over a three-year period.

#### California Public Utilities Commission (CPUC) Grants

- In 2003, Metropolitan partnered with the California Urban Water Conservation Council to use CPUC grant funding to install 12,000 pre-rinse spray valves in restaurants within Metropolitan's service area. The effort is expected to result in savings approaching 14,000 acre-feet over the five-year life of the devices.
- In 2004, a Phase 2 project is funded at the \$2.2 million level to install 17,000 valves.

#### U.S. Bureau of Reclamation Grants

The following projects received funding from USBR during 2003:

- California Friendly Landscape pilot for new homes using incentives to establish up to 10 acres of water- efficient landscaping – \$ 182,000
- Evaluation of data loggers, devices that attach to a water meter to provide precise, unobtrusive water use information – \$ 50,000
- Metropolitan facilitated grantees with funding. Funds were granted directly to applicants for four additional Innovative Conservation Programs – \$ 250,000.

The following projects received funding from USBR in 2004:

- Increased California Friendly Landscape Pilot for new homes by \$60,000
- Synthetic Turf Replacement Program funding to promote, install, and study artificial turf on municipal and other public lands – \$220,000
- World Water Forum for an “innovative conservation and technology” grant program for college and university teams – \$50,000.
- Regional administration and enhanced rebate amounts for Industrial Process Improvement Programs – \$250,000.

The following projects were selected by USBR in 2005, but the funds have not yet been distributed:

- Protector del Agua. Development of web-based classes –\$50,000.
- Landscape Market Analysis – \$50,000.
- City Makeover. Funds for landscape conservation by public agencies. – \$50,000.

#### Water for the West

- Protector del Agua. Development of web-based classes –\$50,000.

#### Proposition 50 Grant Funds

- Residential High Efficiency Clothes Washers. Provided funds to increase the rebate amount – \$1.6 million.
- California Friendly Landscape Pilot for new homes by \$423,000

- High Efficiency Toilets -- \$1 million.
- Protector del Agua. Development of on-line classes --\$77,500.

### ***Measurement and Evaluation***

The Measurement and Evaluation effort has four primary functions:

- Providing a means to measure and evaluate the effectiveness of current and potential conservation programs.
- Developing reliable estimates of various conservation programs and assessing the relative benefits and costs of these interventions.
- Providing technical assistance and support to member agencies in the areas of research methods, statistics and program evaluation.
- Documenting the results and the effectiveness of Metropolitan-assisted conservation efforts.

Metropolitan's staff has served as technical advisors for a number of state and national studies involving the quantification and valuation of water savings.

### ***Other Conservation-Related Activities at Metropolitan***

Conservation activities are closely coordinated with Metropolitan's External Affairs Group. Table III-7 summarizes the major conservation-related activities of BMP 7 administered by External Affairs. Table III-8 shows Metropolitan's extensive commitment to BMP 8's conservation-related education programs.

#### **Water System Operations Group**

Metropolitan's Water System Operations Group works to fulfill BMP 3 (System Water Audits, Leak Detection, and Repair) and BMP 4 (Metering With Commodity Rates for All New Connections and Retrofit of Existing Connections).

#### ***Leak Detection***

Metropolitan has a variety of ongoing system-wide leak detection programs. Each week, a mathematical algorithm compares inflow with outflow for Metropolitan's entire system. Major control structures and hydroelectric plants are inspected weekly. Field crews patrol and visually inspect Metropolitan's pipelines daily for leaks. The 242-mile Colorado River Aqueduct is patrolled daily by both air and ground crews. All underground structures are checked every six months as part of a continuous preventive maintenance program.

#### ***Metering***

As a wholesale water supplier, Metropolitan has no retail customers. However, the majority of inter-agency water service connections are metered. Any new water agency supplied by Metropolitan would likely be metered.

#### **Office of the Chief Financial Officer**

Relevant activities include:

- Re-evaluating the \$154 value provided by the conservation credit program in light of up-to-date supply costs.

- Creating a 5-year strategy document regarding agency financing, including rates.
- Tightening annexation policies to ensure greater compliance with the initiation of water efficiency measures in newly annexed areas.
- Annual SB60 reporting
- Launching the bewaterwise.com website
- Maintaining 9 CIMIS stations
- Conducting a customer attitude survey in 2003
- Developing new incentives for HETs, waterless urinals, and differential incentives for higher Water Factor HECWs
- Completing the Orange County Saturation study in 2002.

Metropolitan charges a fixed unit price per acre-foot for water service to its member agencies. For increases in supplies, Metropolitan's rates include a second tier that is set at the cost of new supply sources, so it is higher than the first tier. The purpose of this second tier is to encourage competition at market rates among alternative water sources, such as water transfers, recycling and desalination. This commodity-based revenue structure complies with BMP 11.

### **Achievements to Date**

Conservation is an integral part of water supply planning and operations at Metropolitan. The Regional Supply Unit works to improve the understanding of the costs and benefits of conservation so investment decisions are both efficient and effective at meeting program goals. As a cooperative member of California's water conservation community, Metropolitan has made significant contributions to the development and coordination of conservation activities throughout the state. These contributions have been recognized in the form of "Gold Star" certification from the Association of California Water Agencies and awards from the United States Bureau of Reclamation and California Municipal Utilities Association.

Table III-9 summarizes Conservation Credits Program savings and payments. Table III-11 summarizes activities Metropolitan implemented in its service area in the past decade (as of the end of FY 2004) and shows the achievements the region has made in implementing these programs. Table III-12 shows the most recent conservation projections by category without future active conservation programs—the total conservation achievement picture based on all activities to date.

### **Summary**

Conservation continues to be an important part of Metropolitan's water supply planning. Continued investment in cost-effective conservation is a key goal in the IRP process, and its importance has increased in the IRP Update.

**Table III-7**  
**External Affairs Group**  
**Conservation-Related Activities**

Program or Activity	Description
Speaker's Bureau	Provides speakers for organizations, service clubs, churches, business and other community groups and associations. An estimated 15,000 – 20,000 people attend these presentations annually.
Community Relations	Organizes and conducts an average of 80 Board of Director-sponsored inspection trips of Metropolitan's distribution system per year for elected officials, community leaders and members of the public. Approximately 3,000 people learn about Metropolitan's conservation and water management policies and practices each year through these trips. Additionally, Metropolitan's education curriculum and program activities engage an average of 150,000 students per year.
Media and Publications	Conducts editorial briefings and media field trips; assembles press packets; prepares and disseminates news releases, speeches, videos, fact sheets, brochures, articles and editorials describing Metropolitan's water management objectives and programs.
Government Relations	Provides elected officials, public agencies, businesses and organizations with information about Metropolitan's water management objectives and programs.

**Table III-8  
School Education Programs**

Program or Activity	Date Initiated	Date Updated	Current Status	Grades	Description
Admiral Splash	1983	2001	Ongoing	Grade 4	A two-week program focusing on southern California history, the water cycle, supply and the distribution system, water uses and conservation.
All About Water	1991	1998	Ongoing	K-3	Activities to teach young students about droughts, conservation, water quality and physical properties of water.
Geography of Water	1993	1998	Ongoing	Grades 4-8	A curriculum module on the relationship between population, precipitation, geography, economics, and water distribution.
Water Politics	1994	2004	Ongoing	Grades 9-12	A case study-based exploration of water supply issues facing southern California, the Colorado River Basin, and the Middle East.
Water Ways	1995	2001	Ongoing	Grade 5	A supplement integrated into fifth-grade U.S. History featuring activities regarding water use, sources, ethics, and environment issues selected from three historical periods. This includes historical attitudes towards the stewardship of water.
Water Quality	2001	-	Ongoing	Grades 7-12	Hands-on activities to investigate water quality issues, with conservation as an element of the overall picture.
Water Works	2001	-	Ongoing	Grades 7-12	A school to career, job specific program featuring activities and profiles on a variety of water-related careers, including conservation specialist.
Water Times	2005	-	Ongoing	Grade 6	An age-appropriate newspaper that provides interdisciplinary concepts, tools, and calculations related to water conservation, and that conveys an overall ethic of water stewardship.

**Table III-9  
Conservation Credits Program**

	Residential	Landscape	Commercial	Total
Water Savings* (AF)				
FY 2003/04	46,575	2,113	5,075	53,763
FY 2002/03	84,816	2,525	4,789	92,130
Since Inception (1990)	620,124	23,502	20,910	664,536
Payments (\$ millions)				
FY 2003/04	6.0	0.1	1.6	7.7
FY 2002/03	12.1	0.1	2.7	14.9

\* Includes code-based conservation originated as active

**Table III-10**  
**Conservation Achievements In Metropolitan's Service Area**

<b>BMP Number</b>	<b>BMP Name</b>	<b>Metropolitan Program Description</b>	<b>Device/Activity Description</b>	<b>Number Implemented</b>	<b>Metropolitan Expenditures</b>
1	Residential Water Surveys	Financial support for surveys, retrofits,	Surveys Toilet devices distributed Residential R&D (projects)	69,901 1,132,765 8	\$1,960,538 \$1,311,740 \$299,799
2	Residential Plumbing Retrofits	Financial support for retrofits and Distributions	Low Flow Showerheads distributed Faucet aerators distributed	2,968,576 225,239	\$12,413,187 \$224,073
6	High Efficiency Washing Machines	Financial support for rebates	Residential High Efficiency washers rebated	93,062	\$6,022,786
14	Residential ULFT Replacement	Financial incentives for toilet retrofits	Some agencies are reaching saturation	2,134,839	\$133,501,638
<b>Residential Sector Total</b>					
5	Large Landscape	Financial support for retrofit surveys	Audits conducted Central controller Protector del Agua graduates Landscape R&D (projects)	2,173 7 30,747 11	\$845,035 \$703,175 \$1,935,205 \$473,868
<b>Large Landscape Sector Total</b>					
9	Commercial, Industrial, Institutional	Financial support for retrofit surveys, workshops and research & development	ULFT Urinals Flush Valve kits Cooling Tower retrofits Clothes Washer rebates Industrial Process Improvements Pre-Rinse spray valves Other device rebates Workshops on commercial retrofits CII R&D (projects)	58,511 2,146 755 640 19,705 3 12,675 1,704 7 11	\$3,777,731 \$168,587 \$18,723 \$311,615 \$4,258,134 \$172,157 \$842,623 \$429,576 \$7,000 \$336,403

**Table III-10 (contd.)**  
**Conservation Achievements In Metropolitan's Service Area**

<b>BMP Number</b>	<b>BMP Name</b>	<b>Metropolitan Program Description</b>	<b>Device/Activity Description</b>	<b>Number Implemented</b>	<b>Metropolitan Expenditures</b>
<b>CII Sector Total</b>					
3	System Water Audits, Leak Detection	Distribution system audits/leak detection	MWD surveys own pipes & aqueducts	96,157	\$10,322,549
4	Metering and Commodity Rates	All connections metered	Yes		\$3,850,000
7	Public Information	Materials & programs provided	Launched multi-media regional message	0	\$15,344,641
8	School Education	Full range of school curricula		0	\$8,990,293
10	Wholesale Agency Assistance	Technical and financial support for BMPs 1, 2, 5, 6, 7, 8, 9, 11, and 14	Regional water efficiency media campaign, some programs managed for MWD's service area		
11	Conservation Pricing	Commodity rate structure in place			
12	Conservation Coordination	Staff of 10 people		0	\$13,282,690
13	Water Waste Prohibition	Exempt		0	\$0
	Various	Programs no longer offered		1,719	\$1,569,070
<b>Miscellaneous Programs Total</b>					
<b>Cumulative Total Spent by Metropolitan Water District through FY 2004:</b>				<b>1,719</b>	<b>\$43,036,694</b>
					<b>\$213,050,287</b>

**Table III-11**  
**2005 UWMP Final Forecast**  
**Total Conservation - All Sources Plus IRP Target**

	2005	2010	2015	2020	2025	2030
Existing Active (through 2004)*	97,000	94,000	92,000	92,000	91,000	91,000
Code-based, Price-Effect, and Remaining IRP Target	389,000	521,000	613,000	686,000	766,000	847,000
Pre-1990	250,000	250,000	250,000	250,000	250,000	250,000
Total	736,000	865,000	955,000	1,028,000	1,107,000	1,188,000

\* Includes code-based savings originated through an active implementation program

### III.3 RECYCLING, GROUNDWATER RECOVERY, AND DESALINATION

#### IRP Goals

With the adoption of the 1996 IRP, Metropolitan's members and Board set resource goals for Metropolitan to achieve during the next 25 years to meet its supply reliability and water quality objectives in a cost-effective manner. These goals call for strong reliance on local water management options, including conservation and increased use of local resources.

Metropolitan's projection of the regional implementation of direct-use recycling, groundwater recovery, and seawater desalination exceed the 1996 IRP goals. In 2004, Metropolitan's board adopted an IRP Update that includes a target of 150,000 acre-feet per year for seawater desalination projects to meet future demands.

The 1996 IRP set a year 2020 production target for combined water recycling and groundwater recovery elements totaling 500 taf per year. Of that amount, about 251 taf per year (FY 2002) are currently being produced: 209 taf per year from recycling and 43 taf per year from groundwater recovery. The IRP Update set a year 2025 target production for combined water recycling, groundwater recovery, and seawater desalination elements totaling 750 taf per year, including an increase of 250 taf as a supply buffer. Table III-12 shows the IRP goals for these water supplies.

**Table III-12**  
**Target Range for Water Supplies from**  
**Recycling and Groundwater Recovery**

<b>Year</b>	<b>Delivery Goals (taf)</b>
2005	355
2010	410
2020	500-750
2025	500-750

Water recycling has proven to be an effective drought-proof supply, and it helps local agencies comply with environmental regulations. Currently, more than half of the water recycling in California occurs in Metropolitan's service area. In addition, local agencies have implemented several projects to recover contaminated or degraded groundwater for potable uses that help meet the region's current or future water demand. The groundwater recovery projects use a variety of treatment technologies to remove undesirable constituents such as nitrates, VOCs, perchlorate, color and salt. The increases in groundwater production in some cases require additional artificial replenishment and may not be sustainable on an annual basis. Desalination of brackish groundwater and other local supplies is also an important element in the continued supply reliability of the region.

## Issues

The previous Urban Water Management Plan and the IRP Update meetings with member agencies highlighted an important issue: a significant amount of future recycling has been dedicated to groundwater replenishment and seawater barriers (non-consumptive or non-direct use) rather than for direct use to offset potable demand (urban or agricultural), which was the expectation when Metropolitan developed its 1996 IRP recycling target. Some member agencies are using recycled water for groundwater replenishment and seawater barriers. Thus, supply analyses must properly identify the use of potable and non-potable water.

### ***A. Recycling***

Local water recycling projects involve the collection of wastewater that is currently discharged within the service area, treating that water to a suitable standard for specific uses, and using recycled water for non-potable uses. This section provides a description of the water sources that potentially could be used for recycled water.

#### *Wastewater Disposal in the Service Area*

As part of regional planning that encourages the collection and use of recycled water, a database has been developed to catalogue the name of each wastewater treatment facility, operating agency, location and elevation of the facility, extent of wastewater treatment, capacity and anticipated production, method of effluent disposal, and influent and effluent water qualities. This database identifies 89 wastewater treatment plants within Metropolitan's service area, as shown in Table III-13.

Secondary treatment capacity provides an indication of the amount of wastewater being generated and disposed of within Metropolitan's service area. Most wastewater plants in the service area provide secondary treatment using activated sludge. This level of treatment is required to comply with the Clean Water Act. Inland wastewater plants generally provide treatment to tertiary levels for effluent disposal to a stream or other water body or for beneficial reuse. A small percentage of tertiary treated effluent undergoes reverse osmosis or electrodialysis reversal processes, producing high-quality recycled water for groundwater recharge, industrial, or, in some instances, municipal uses.

Within Metropolitan's service area, many local agencies collect and treat municipal wastewater. Some of the largest agencies include:

- Los Angeles County Sanitation Districts
- Orange County Sanitation District
- City of Los Angeles Bureau of Sanitation
- San Diego Metropolitan Wastewater Department
- Eastern Municipal Water District
- Inland Empire Utilities Agency

**Table III-13**  
**Existing and Projected Total Effluent Capacity**  
**Wastewater Treatment Plants within Metropolitan's Service Area**

<b>Treatment Level</b>	<b>Existing Capacity(MGD)</b>	<b>2010 Capacity (MGD)</b>	<b>2040 Capacity (MGD)</b>
Primary	2120	2668	3139
Secondary	1546	2232	2708
Tertiary	607	1080	1464
Advanced	34	184	229

This data was compiled as part of the South California Comprehensive Water Reclamation and Reuse Study and is included in the Phase IB Summary Report – December 1998.

Many small special-purpose wastewater agencies, dual-purpose (water and wastewater) special districts, and municipal wastewater agencies also operate within Metropolitan's service area.

As a rule, wastewater is collected in a sewer collection system, and it flows by gravity to a centrally located treatment plant. Once treated, wastewater is disposed of through one of three mechanisms:

1. Ocean Outfalls – Treated wastewater is either disposed of directly through an ocean outfall or conveyed to the ocean outfall via a land pipeline.
2. Reuse – About 209 taf per year goes to irrigation, industrial processes, and groundwater recharge applications. A few inland treatment plants (in Riverside and San Bernardino counties) irrigate feed and fodder crops with recycled water. While this use is considered beneficial, it is not necessarily the highest and best use for recycled water, but high value uses will require more developed markets.
3. Live Stream Discharge – A number of inland plants pump treated effluent into local streams and rivers. That water is then used downstream for beneficial uses, or it flows into the ocean. Some of the affected rivers (or ephemeral streams) include:
  - Los Angeles River
  - Santa Ana River
  - Calleguas Creek
  - Rio Hondo & San Gabriel Rivers
  - Santa Margarita River

#### *Regional Planning for Optimal Recycling*

In the 1990s, the United States Bureau of Reclamation, in conjunction with Metropolitan, the California Department of Water Resources, and six other Southern California water agencies, studied the feasibility of regional water reclamation projects in Southern California.<sup>1</sup> This study

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<sup>1</sup> This was the Southern California Comprehensive Wastewater Recycling and Reclamation Project (SCCWRRS).  
 RECYCLING, GROUNDWATER RECOVERY AND DESALINATION

identified 34 potential regional projects within Metropolitan's service area with an estimated yield of 450 taf per year. Metropolitan and its member agencies continue to explore these and other projects and to develop updated plans on a regular basis.

### *Uses of Recycled Water*

Currently, there are about 355 taf per year of planned and permitted uses of recycled water throughout Metropolitan's service area. These uses include landscape irrigation, commercial and industrial use, seawater intrusion barriers, and groundwater recharge applications. Approximately 480 taf per year of new recycled water could be developed in Metropolitan's service area by the year 2025, and an additional 130 taf per year could be developed by the year 2050, for a total of 610 taf per year. A number of these projects are currently being implemented and will go on-line within the next five years. Other projects are in various stages of planning, and their development will depend on cost, financing, regulatory actions, and water supply demands.

### Groundwater Recharge

Metropolitan's service area overlies numerous groundwater basins, many of which are overdrafted, and some of which are threatened by seawater intrusion. Water agencies along the Los Angeles and Orange county coastline inject water into the underlying groundwater basins to create a barrier against this seawater. A limited amount of the injected water originates as captured storm water, but the major part is recycled water, imported water, or water extracted from deep wells. Increasing the proportion of recycled water can free imported water for direct consumption. Currently, approximately 60 taf per year of recycled water is "permitted" for recharge and seawater barrier injection into the Orange County, Central and West Coast groundwater basins.

About 30% of the recycled water in Metropolitan's service area is used for groundwater replenishment and seawater barriers. Table III-14 presents a summary of this recycled water use.

**Table III-14**  
**Existing Groundwater Replenishment and Seawater Barrier**  
**Injection Projects Using Recycled Water**  
(af per year)

<b>Project</b>	<b>Recycled Water Use</b>
OCWD Water Factory 21	2,700
West Coast Barrier <sup>1</sup>	7,500
Central Basin Spreading	45,000
Alamitos Barrier	3,000
<b>Total</b>	<b>58,200</b>

<sup>1</sup> An additional 5,000 af per year of recycled water is expected to be permitted in 2006.

On average, these and other seawater barriers recharge approximately 50 taf per year with imported water or water from extraction wells. Within the next decade, projections show that 90 percent of the water used for seawater barriers will be supplied by recycled water treated with microfiltration followed by reverse osmosis, freeing other water for direct consumption.

Large-scale groundwater replenishment projects require case-by-case review by the California Department of Health Services (CDHS). The greater the percentage of recycled water used for replenishment, the more stringent the CDHS requirements.

Typically, groundwater recharge projects are linked with construction of new wells to increase basin yield and offset demand for imported water. This conjunctive use element of groundwater recharge projects adds the cost of groundwater extraction facilities and energy to the project's total cost. New wells cost between \$500,000 and \$1 million.

One potential concern related to the use of recycled water for groundwater recharge could be adverse impacts to groundwater quality from organic contaminants, metals, and salts. CDHS has proposed regulations for recharge with recycled water into an aquifer used as a domestic supply source. The proposed regulations limit the amount of recycled water that can be recharged to a maximum of 20 percent blend at the nearest production well without treatment, and treatment technologies are prohibitively expensive. Despite these regulations, a large market exists for the use of recycled water, but realizing a significant demand for recycled water will require modifying regulations based on future studies of the health effects of recycled water.

#### Industrial

Industrial users represent a large potential market for recycled water, particularly in areas that are heavily industrialized, such as the cities of Vernon, Commerce, Industry and the Wilmington area of Los Angeles. Additionally, refineries in El Segundo in West Basin MWD's service area and in the City of Torrance use approximately 8 taf per year of recycled water. Typical industrial uses include cooling tower makeup water, boiler feed water, paper manufacturing, carpet dyeing, and process water. Industrial users are high-demand, continuous-flow customers, which allows greater operational flexibility by allowing plants to base load operations rather than contend with seasonal and diurnal flow variations. Because of these operational benefits, industrial users reduce the need for storage and other peak demand facilities and management.

#### Irrigation

Currently, about 86 taf per year of recycled water is used to irrigate golf courses, parks, schoolyards, cemeteries and greenbelts throughout Southern California. Using recycled water for irrigation reduces the need for imported water during the critical summer months and in drought situations when water supplies are most scarce.

#### *Technical and Economic Issues of Recycled Water*

Recycled water is the fastest growing local water supply source in Metropolitan's service area. Expanding its use will depend on progress in research, regulatory change, public acceptance, and financing of local projects.

Metropolitan supports:

- Increasing water recycling in California and the Colorado River Basin;
- Advocating funding assistance by parties that benefit both directly and indirectly;
- Expanding recycled water uses;

- Reviewing recycled water regulations to ensure streamlined administration, public health and environmental protection;
- Planning efforts and voluntary cooperation and partnerships at the local and statewide levels;
- Conducting research and studies to address public acceptance, new technologies and health effects assessments.

Funding - Capital risk is a significant constraint to increased recycled water project development. Recycled water systems are separate from the potable system, so projects require significant capital investments in treatment and distribution. The variability in demand for recycled water lengthens the time needed to fully develop markets, which can affect project economics by increasing unit costs during early years of operation. Uncertainty of market demands creates a risk to the cost recovery required for the repayment of capital debt.

Estimates show the need for \$2.6 billion in capital improvements for near-term projects to develop 450 taf per year of recycled water from future projects. This funding could come from many sources, including water agencies, wastewater agencies, and federal and state funding programs. However, the large capital risk may deter agencies from undertaking these projects.

Metropolitan developed the Local Projects Program (LPP) and subsequently the Local Resources Program (LRP) to assist member agencies in overcoming this obstacle. In its role as the regional water supplier, Metropolitan provides financial assistance to participating projects that offer regional benefits to offset regional supply shortages.

In addition to the LPP and LRP, many water agencies partner with wastewater agencies to provide needed financial resources. The San Diego County Water Authority's Reclaimed Water Development Fund assists local agencies in developing recycling projects in San Diego County. Wastewater agencies understand that beneficial reuse may be a cost-effective alternative to regulatory and disposal issues. Implementing a reuse program can defer or eliminate the need for ocean outfall expansions and extensions. Also, a recent trend by the regulatory community to require zero discharge during certain periods encourages wastewater agencies to consider water reuse as a supply option. Project partnerships between water supply and wastewater treatment agencies have led to projects in which both entities contribute financial resources and share multiple benefits.

The Bureau of Reclamation's Title XVI program represents another major funding source. Title XVI was authorized by Congress in 1992, and approximately \$232 million has been appropriated to projects in Metropolitan's service area.

Proposition 204 (1996 bond measure) provided \$60 million for water recycling loans. Proposition 13, approved by voters in 2000, has supplemented Proposition 204 funds with \$40 million in grants and low interest loans. Proposition 13 funding also provided \$235 million to the Santa Ana Watershed Project Authority, a portion of which will likely be used to fund recycled water projects. Proposition 50, passed in 2002, includes funding for the development of local projects including water recycling, and it is expected to be an important source of funding for local projects.

In the recent Framework For Action, CALFED staff recommended that state and federal governments spend up to \$2 billion over the next seven years on water use efficiency projects, including water conservation and recycling.

### Regulatory Issues

Two state agencies are involved in regulating water recycling projects. The Regional Water Quality Control Board (RWQCB) is the permitting authority, and the California Department of Health Services (CDHS) oversees health concerns and standards. Combining water quality concerns and health effects requires meeting stringent goals and standards. Title 22 of the California Administrative Code provides specific guidelines for treatment levels and corresponding reuse opportunities. However, there are no uniform criteria for groundwater recharge applications. Currently, state regulatory agencies review and determine requirements for recharge projects on a case-by-case basis. In many instances, CDHS is required to make interpretations regarding Title 22.

### Institutional Issues

Often, multiple local agencies are involved in a proposed water recycling project. For example, recycled water from a single wastewater source may be used by a number of recycled water distributors, or the recycled water may be treated and delivered by an agency in one service area and used in another. Also, an agency responsible for wastewater collection and treatment may wish to deliver recycled water within a water district's service area. Projects that involve groundwater recharge require close coordination with groundwater managers. In most instances, these projects require a committed agency that is willing to negotiate with other affected agencies to develop water recycling.

### Water Quality

Water quality requirements for various types of irrigation and industrial purposes are a critical issue when evaluating whether recycled water will be an acceptable supply. Recycled water quality is carefully analyzed to determine whether there are any constituents (such as TDS, chloride, pH, or ammonia) that may cause a problem for a specific application of recycled water.

### Seasonal Storage

Production of wastewater at a water reclamation plant is relatively uniform year round since indoor residential use does not vary much from winter to summer. (Flows may be higher in the winter at the wastewater reclamation plant from stormwater inflow into the sewers.) However, more than 60 percent of irrigation demand on recycled water (parks, golf courses, etc.) is in summer (May through September). Therefore, some recycled water projects store surplus production of recycled water in the winter for later use during the dry summer months to optimize recycling. Agencies such as Las Virgenes Municipal Water District and Irvine Ranch Water District have undertaken extensive engineering and operational studies to manage their seasonal supply variations. Operational storage also is needed because regulations only allow watering at night to reduce opportunities for direct public contact.

### Brine Disposal

Brine disposal is a critical issue facing Southern California in the further development of recycled water projects. Metropolitan and the U.S. Bureau of Reclamation conducted a Salinity Management Study that identified the need for approximately \$200 million in additional brine sewer lines to export salts from the watersheds to the ocean. The study recommended that these

brine lines be built to maintain the long-term salt balance of the groundwater basins and to maintain the quality of the recycled water supplies at water reclamation plants. The Southern California Salinity Coalition, a coalition of water and wastewater agencies, has advocated for state and federal financial assistance to build the regional brine lines.

#### Public Acceptance

Public education programs are an integral part of recycled water project implementation. Recycled water users and the general public need to be educated on recycled water benefits, and they need to be reassured of the safety of recycled water. To encourage public acceptance, Metropolitan supports a continuous review of recycled water use regulations to ensure streamlined administration, public health, environmental protection, and research efforts that address public acceptance, new technologies, and health effects assessments.

#### ***B. Groundwater Recovery***

All Southern California groundwater basins experience varying degrees of water quality challenges as a result of urban and agricultural uses. The accumulation of high-salinity water and degradation from volatile organics are two common constraints to the economic use of groundwater for urban applications. In some cases, the threat of increased salt buildup can also complicate conjunctive use of groundwater basins and imported supplies.

In limited instances, recovering degraded groundwater costs less than purchasing imported water from Metropolitan. As a result, these projects have moved forward on their own because they make economic sense. In many cases, particularly where total dissolved solids are the constituent of concern, more expensive membrane processes are required, and agencies are more reluctant to make the capital investments necessary to recover the degraded water. In those cases, agencies typically seek financial assistance to offset costs to the extent that recovering degraded water has a regional benefit.

Use of degraded groundwater normally requires high levels of treatment. Once treated, however, recovered groundwater may be delivered to potable water systems. Membrane processes used to recover the majority of severely degraded water have a high capital cost and incur a high operational cost for power.

All processes that recover degraded groundwater also produce concentrated waste flows for which disposal can be problematic. Most importantly, membrane processes produce significant volumes of brine – about 15 percent of the treated water – that require disposal to an ocean outfall or sanitary sewer. Since discharge to sewers only exacerbates the salinity problems that challenge downstream water recycling projects, brine disposal requires expensive ocean outfalls.

Lastly, most of the groundwater basins in Southern California are regulated by basin managers. Where the safe yield of a groundwater basin is at its maximum, these regulations might require that recovered groundwater projects include replenishment with supplemental water.

Metropolitan initiated its Groundwater Recovery Program (GRP) in 1991 to encourage local agencies to treat and use degraded groundwater for municipal purposes. Under the GRP, Metropolitan provided financial assistance of up to \$250 per acre-foot to local agencies for the construction and operation of project facilities used to recover degraded groundwater that will

cost the implementing agency more than purchasing that water supply from Metropolitan. The GRP was open to all technologies that recovered and used degraded groundwater. The GRP was retired in 1998 with the initiation of the Competitive Local Resources Program, which includes both recycled water and groundwater recovery projects.

### ***C. Seawater Desalination***

Until recently, seawater desalination has been considered uneconomical to be included in the region's water supply mix. However, recent breakthroughs in membrane technology and plant siting strategies have helped reduce desalination costs, warranting consideration among alternative resource options outlined in Metropolitan's IRP Update. The IRP Update includes a target of 750,000 AFY of local water production by 2025 that could include up to 150,000 AFY of seawater desalination.

As a first step to implementing this plan, Metropolitan issued a competitive request for proposals targeting 50,000 AFY of desalinated seawater. Metropolitan would provide financial assistance of up to \$250 per acre-foot of desalinated seawater developed and used within Metropolitan's service area for up to 25 years. Five member agencies submitted proposals for about 142,000 AFY of desalinated seawater, including San Diego County Water Authority, Long Beach Water Department, Los Angeles Department of Water and Power, West Basin Municipal Water District, and the Municipal Water District of Orange County, which are expected to come on line by 2015.

However, the implementation of large-scale seawater desalination plants faces considerable challenges. These challenges include high capital and operation costs for power and membrane replacement, availability of funding measures and grants, addressing of environmental issues, and addressing the requirements of permitting agencies, such as the Coastal Commission. These issues require additional research and investigation. Metropolitan is providing \$250,000 to five member agencies to conduct research in various aspects of seawater desalination. They are reviewing and assessing treatment technologies, pretreatment alternatives, and brine disposal issues, and they are identifying and evaluating resource issues such as permitting, environmental review and the regulatory approvals associated with the delivery of desalinated seawater to regional and local distribution system.

Metropolitan is also assisting its member agencies in the joint development of legislative strategies to seek funding in the form of grant and/or loans, and to inform decision-makers of the role of seawater desalination in the region's future water supplies. Metropolitan is also monitoring the strategies and outcomes of other programs (such as that in Tampa Bay, Florida) to gain insights into seawater desalination implementation and cost issues.

## **Changed Conditions**

The status of locally planned recycling and groundwater recovery projects changes from year to year. Metropolitan periodically surveys its member agencies for planned projects to coordinate local supply projections and plans. Changes in long-term strategies, regulations, funding priorities, and new opportunities contribute to changing outcomes. In fact, this dynamic nature of local supply plans accounts for much of the change between the 1996 IRP and the Update.

Other changes since the 1996 IRP include the following:

- Decreases in the estimated cost of seawater desalination;
- Faster than expected development of groundwater recovery supplies;
- Decrease in potable supply offset by recycled water due to higher than projected local recycling production dedicated to non-direct uses, such as groundwater replenishment and seawater barriers.

## **Implementation Approach**

The IRP Preferred Resource Mix provides Metropolitan with an optimum strategy to meet future water supply reliability needs. Developing locally owned water recycling, groundwater recovery, and seawater desalination projects allows Metropolitan to reduce its capital improvements and its O&M costs for water importation, treatment, and distribution. Metropolitan schedules its financial assistance for these types of projects to conform to expanding regional needs for imported water.

Since 1982, Metropolitan has implemented several programs to provide financial assistance to its member agencies and subagencies for developing local water supplies. Metropolitan's incentive programs are predicated on a pay-for-performance principle, with incentive payments provided on a contractual basis for yield developed by local agencies and applied to beneficial uses. These incentive programs have been instrumental in helping the region implement the 1996 IRP local resource targets. Since the inception of the program, Metropolitan has invested more than \$165 million and partnered with member agencies on 54 recycling projects and 20 groundwater recovery projects. Member and retail agencies have also funded a significant number of local projects without Metropolitan funding, many of which pre-date Metropolitan's incentive programs.

## **Metropolitan's Incentive Programs**

### Local Projects Program

Metropolitan implemented the LPP in 1982 to assist with the development of recycled water supply projects. At that time, the Board recognized that water recycling generally costs more than buying imported water from Metropolitan. Since then, the LPP was modified to continue the development of water recycling projects in Southern California. The basic purpose of the LPP was to provide financial support to local agencies developing recycled water projects that cost more than Metropolitan's imported supplies, thus reducing the demand for imported water and improving regional water supply reliability.

Between 1986 and 1990, the LPP contribution for a project was a minimum of \$75 per af of production, which roughly equaled Metropolitan's avoided energy cost for pumping an equivalent amount of water through the State Water Project. In April 1990, Metropolitan's Board modified the LPP contribution to \$154 per af. In August of 1995, Metropolitan's Board adopted the Local Resources Program (LRP) Conversion and revised the contribution scheme for existing LPP projects. The contribution for a project ranged from \$0 to a maximum of \$250 per af, based on the difference between the project's unit cost and Metropolitan's treated water rate. Existing participants in the LPP had a choice of remaining at the flat rate of \$154 per af or converting to the revised contribution methodology. LPP and Local Resources Program Conversion were retired in 1998 with the initiation of the Competitive Local Resources Program.

#### Groundwater Recovery Program

Following on the success of its LPP, which included two projects to recover degraded groundwater, Metropolitan initiated its Groundwater Recovery Program (GRP) in 1991 to encourage local agencies to treat and use degraded groundwater for municipal purposes.

The GRP supported member agency efforts to improve regional water supply reliability through conjunctive use and the development of additional local sources of supply. Similar to the LPP, Metropolitan provided financial assistance to local agencies for the construction and operation of project facilities used to recover degraded groundwater that will cost the implementing agency more than purchasing that water supply from Metropolitan. Unlike LPP, Metropolitan provided financial assistance based on the difference between the project unit cost and Metropolitan's treated water rate, up to a maximum of \$250 per af. The GRP was open to all technologies that recovered and used degraded groundwater. The GRP was retired in 1998 with the initiation of the Competitive Local Resources Program, which includes both recycled water and groundwater recovery projects.

#### Competitive Local Resources Program

In June 1998, following extensive joint development and endorsement from Metropolitan's member agencies, Metropolitan's Board retired the LPP, GRP, and LRP Conversion programs and established the Competitive LRP in their places. The primary objective of the Competitive LRP is to support the development of cost-effective water recycling and groundwater recovery projects that reduce demands for imported supplies. The Competitive LRP uses a competitive Request for Proposals (RFP) process to encourage the development of cost-effective recycled and groundwater recovery projects.

To qualify for inclusion in the LRP, a project must be selected through a competitive RFP process. A review committee provides an objective evaluation of project proposals and identifies the mix of project proposals that best meets the region's needs consistent with the objectives of the IRP. Qualifying and scoring criteria guide the review committee in its ranking of LRP project proposals. These criteria set basic standards to ensure that the proposed project provides an increased level of recycled water and is capable of being implemented. Projects that pass the qualifying criteria received a numerical score based on the following categories:

- Readiness to proceed
- Diversity of input discharges
- Regional water supply benefits

- Water quality benefits
- Metropolitan facility benefits (will the project postpone or delay new facilities?)
- Operational reliability and probability of success
- Increased beneficial uses
- Cost to Metropolitan

In 1998, Metropolitan issued an RFP to meet the short-term goal of obtaining an additional 53 taf per year of local resource production by 2010, offering incentives of up to \$250 per af for terms of up to 25 years. The RFP specified that Metropolitan would select project proposals based on selection criteria up to these levels. In response to the RFP issued in 1998, Metropolitan received a total of 28 proposals with an ultimate yield of more than 140 taf per year. Fourteen projects with a combined total yield of 51.5 taf per year were selected for inclusion in the LRP, and contracts for Metropolitan to provide financial assistance have been executed. In April 2003 Metropolitan issued an additional RFP, offering financial incentives of up to \$250 per acre-foot for terms of up to 25 years. In response, member agencies submitted 27 proposals for projects that would produce 113 taf per year. A review committee of Metropolitan staff and water resource consultants evaluated the proposals using selection criteria previously adopted by the Board. This process resulted in the selection of thirteen projects to be eligible for incentive payments, as shown in Table 15. Future targets for recycling production identified in the IRP Update will likely use a similar competitive process. Metropolitan will continue to assist in the development of recycled water projects in Southern California as its ongoing planning process identifies water recycling needs.

#### Seawater Desalination Program

Metropolitan and its member agencies view seawater desalination as a future component of a diversified water supply portfolio. Recent and continuous breakthroughs in membrane technology have helped reduce desalination costs, warranting consideration among alternative resource options outlined in Metropolitan's IRP. The IRP Update includes a target of 750 taf per year of local water production by 2025 that includes up to 150 taf per year of seawater desalination.

**Table III-15  
Thirteen Local Resource Program Projects Selected in 2004**

<b>Project / Member Agency</b>	<b>Yield (AF/Yr)</b>	<b>Contribution (\$/AF)</b>
City of Industry Regional WRP / Three Valleys MWD	8,867	50 – 200
Direct Reuse Phase IIA / Upper San Gabriel Valley MWD	2,258	65-200
Groundwater Replenishment System / MWDOC	31,000	100-137
Hansen Area WRP / LADWP	3,665	12-250
IRWD Recycled Water System Upgrade / MWDOC	8,500	117
Pomona Well No. 37 / Three Valleys MWD	1,100	100
RW Distribution Extension / Las Virgenes MWD	225	155
RW Distribution Ext. Malibu Golf Course /Las Virgenes	300	175
RW Pipeline Reach 16 / Eastern MWD	820	82
Sepulveda Basin WRP Phase IV / LADWP	546	125
South Valley Water Recycling Project / LADWP	1,000	175
Tapo Canyon WTP / Calleguas MWD	1,445	100
Wells No. 7 & 8 / Torrance	5,189	160

Source: Metropolitan's SB 60 Report

Metropolitan initiated the Seawater Desalination Program (SDP) in 2001. This program provides financial assistance of up to \$250 per af per year for 25 years for desalinated seawater that is developed and used within Metropolitan's service area. Five member agencies have submitted proposals for about 142 taf per year of desalinated seawater: San Diego County Water Authority, Long Beach Water Department, Los Angeles Department of Water and Power, West Basin Municipal Water District, and the Municipal Water District of Orange County. The Board has directed Metropolitan staff to develop contracts to pursue projects proposed under this program.

Metropolitan continues to work with its member agencies to develop a research agenda for specific projects. Metropolitan is also involved in efforts to assess current desalination projects and to compare project features and applicability to Southern California, such as an evaluation of permitting and regulatory approvals associated with delivery of desalinated seawater to regional and local distribution systems.

#### Innovative Supply Program

This program was designed to encourage investigations into alternative approaches to increasing the region's water supply. In April 2003 Metropolitan issued a solicitation for competitive proposals to investigate these innovative ideas. The competitive program provides a systematic

approach to objectively consider proposals from organizations and individuals on new supply ideas rather than on a case-by case basis.

Metropolitan received 17 proposals including harvesting storm runoff, on-site water recycling, desalination and waterbag technology for brine disposal. The proposals requested total funding of \$1.2 million, almost 5 times the project budget of \$250,000. The proposals were scored according to the innovativeness of the proposal, the likelihood of success, and the potential benefits to Metropolitan and its member agencies.

In May 2004, Metropolitan selected 10 projects for grant funding. Currently, seven projects completed investigations and submitted final reports documenting findings. The remaining projects require more time to complete. Staff will report findings to the board upon completion of the remaining projects later this fiscal year, and a workshop will be held with member agencies to review and consider the results.

### **Achievements to Date**

Since 1982 Metropolitan has committed to providing financial assistance to the development of water recycling projects throughout its service area. Since adopting the IRP in 1996, Metropolitan, along with its 26 member agencies, has made significant progress in achieving regional targets for recycling and groundwater recovery. Metropolitan currently provides funding to 54 recycled water projects, of which 39 were in operation in 2004. Local projects not receiving funding from Metropolitan provide an additional 134 taf of recycled water to the region.

Since 1991, Metropolitan executed GRP and LRP contracts for 20 recovered groundwater projects that produced about 43 taf per year in 2004. In addition to the projects under Metropolitan's programs, about 21 taf per year of degraded groundwater is recovered by agencies in Metropolitan's service area without Metropolitan's financial assistance.

Table III-16 summarizes the current level of regional production from these local projects. To date, Metropolitan has invested \$124 million in recycling programs and \$41 million for groundwater recovery. In March 2004, Metropolitan selected 13 additional projects for funding through the Local Resources Program. Metropolitan plans to provide about \$158 million toward developing these projects over the next 25 years. These new groundwater recovery and recycled water projects are expected to collectively produce about 65,000 acre-feet per year of additional local supplies. Table III-17 summarizes groundwater and recycled water production and incentive payment to date.

In 2003, Metropolitan conducted an audit of the performance of projects under the LRP. As a result, it terminated LRP incentive agreements for non-performing projects and reduced its financial obligations for projects with poor performance. The goal of these actions was to ensure that the programs funded continued to provide cost-effective water supplies to the region.

## Summary

Metropolitan has continued to develop and refine its programs to encourage the involvement of its member agencies in water recycling, groundwater recovery and desalination. The adopted IRP Update relies heavily on these sources for future water supply. Changing conditions over the last five years have reduced the costs of these options. Development and management of these programs requires considerable coordination and refinement, to allow Metropolitan to adjust to changing conditions and to achieve its IRP goals.

**Table III-16**  
**2004 Water Production From Recycling and Groundwater Recovery**  
**(taf)**

<b>Type of Project</b>	<b>With Metropolitan Funding</b>	<b>Without Metropolitan Funding</b>	<b>Total</b>
Recycled Water	75	134	209
Groundwater Recovery	43	21	64
<b>Total</b>	<b>118</b>	<b>155</b>	<b>273</b>

**Table III-17**  
**Local Resources Programs**

	<b>Recovered Groundwater</b>	<b>Recycled Water</b>	<b>Total</b>
<b>Projects<sup>1</sup></b>			
Planned	24	57	81
In Operation	18	41	59
Ultimate Yield (AFY)	84,110	270,986	355,096
<b>Deliveries (af)<sup>2</sup></b>			
FY 2004/2005	34,374	65,394	99,768
FY 2003/2004	43,181	75,619	118,800
Since Inception	278,055	732,358	1,010,412
<b>Payments (\$ millions)</b>			
FY 2004/2005	\$6.34	\$13.34	\$23
FY 2003/2004	\$8.28	\$14.95	\$22
Since Inception	\$47.8	\$137.5	\$165

<sup>1</sup> 12 project agreements are no longer in effect.

<sup>2</sup> 2004/2005 values are lower than the previous year because high local precipitation led to reduced demand for irrigation water.

### **III.4 STORAGE AND GROUNDWATER MANAGEMENT PROGRAMS: WITHIN THE REGION**

#### **IRP Goals**

The region's water supply relies on a number of sources affected by variations in precipitation. In addition, the imported water supplies are transported to the region in aqueducts that cross a number of seismic faults, which could put the region's imported water supply at risk at any particular time.

Since the 1950s, local water management in Metropolitan's service area has included the conjunctive use of surface water and groundwater sources. Conjunctive use of water refers to the use and storage of imported surface water supplies in groundwater basins and reservoirs during periods of abundance. This stored water is available for use during periods of low surface water supplies as a way of dealing with seasonal and multiyear imbalances of supply and demand.

To prepare for supply disruptions, Metropolitan and its member agencies have adopted goals for water storage within the region. Metropolitan has identified 400 taf of storage that should be set aside for use in emergencies, such as a disruption to the California Aqueduct. In addition to that storage, Metropolitan's planning process calls for dry-year storage that can be called on at times of supply shortage due to drought. The 1996 IRP identified a 2020 in-region surface water target of 620 taf of dry year storage - 400 taf of dry year storage in Diamond Valley Lake (DVL), and about 220 taf in the SWP terminal reservoirs (Castaic and Perris) made available through the Monterey Amendment to the SWP contract. This target has been achieved and remains unchanged in the IRP Update.

Additional storage capacity is available through conjunctive use of the region's groundwater basins. Basins are recharged with imported surface water supplies using spreading basins and injection wells. Numerous recharge facilities in Southern California are currently being used to replenish groundwater basins. The 1996 IRP identified the need for about 200 taf per year of dry-year yield from in-region groundwater storage by 2000, 275 taf by 2010, and 300 taf by 2020. The IRP Update retained these targets.

#### **Issues**

Metropolitan established general long-term storage guidelines in the 1999 Water Surplus and Drought Management (WSDM) plan. The WSDM plan provides for flexibility during dry years, allowing Metropolitan to use storage for managing water quality, hydrology, and SWP issues. Dry-year surface storage yields have been characterized in several ways, including delivery capabilities over two and three-year dry periods. The approach used in the IRP Update assumes dry-year surface storage can be used as needed and as available within the WSDM planning framework.

In analyzing its groundwater storage programs, Metropolitan has found that a ratio of groundwater storage capacity to delivery capability of three to one generally allows for maximizing storage use under historic hydrologic variation while minimizing capital cost. In other words, for every 3,000 acre-feet of groundwater storage capacity, there should be 1,000

acre-feet of delivery capability. A ratio of less than three-to-one poses a risk of being unable to withdraw sufficient water during times of drought. Most of Metropolitan's groundwater programs have this ratio as a planning goal. With that ratio, the annual dry-year yield reported here may be maintained for three consecutive dry years.

As regional demands grow, the estimated need for emergency storage also increases. The dedicated dry year storage in DVL is expected to gradually decline to the 1996 IRP target of 400 taf by 2030.

### **Changed Conditions**

Metropolitan has also refined its characterization of the flexible storage available in the SWP terminal reservoirs. Previous planning studies assumed that up to 50 percent of the available SWP flexible storage could be used in a repeat of a single dry year event, such as the 1977 hydrology. In the IRP Update Report, dry-year surface production, including Monterey storage, is not limited in this way. Instead, Metropolitan's reliability modeling determines the availability of stored surface water supplies in each forecast year based on historical hydrology.

For the groundwater storage programs, changed conditions since the 1996 IRP include a broadening of Metropolitan's groundwater programs from rate discount-based storage programs to include contract-based programs and bond funding for local groundwater storage projects. Previous discount-based programs provided water to those member agencies that stored the water. The region as a whole benefited from this program because those member agencies could reduce their demands in times of shortage. With contractual storage programs, however, Metropolitan retains the ability to call upon the stored water when needed, which increases the regional benefit of the stored water.

Since the 2000 UWMP, additional groundwater funding mechanisms have become available.

- In 2000, Proposition 13 appropriated \$45 million for groundwater conjunctive use projects in Metropolitan's service area.
- The same Proposition made another \$200 million available for additional local groundwater storage and recharge projects throughout California based on a competitive bid process.
- In 2002, Chapter 7 of Proposition 50 made \$76 million available for state water supply reliability, and Chapter 8 of Proposition 50 made \$500 million available for water management programs. Proposition 50 grants are allocated through a competitive-bid process similar to that of Proposition 13.

## Implementation Approach

### A. Surface Storage

Since the beginning of the IRP process, two significant changes have occurred to regional surface storage.

#### Diamond Valley Lake

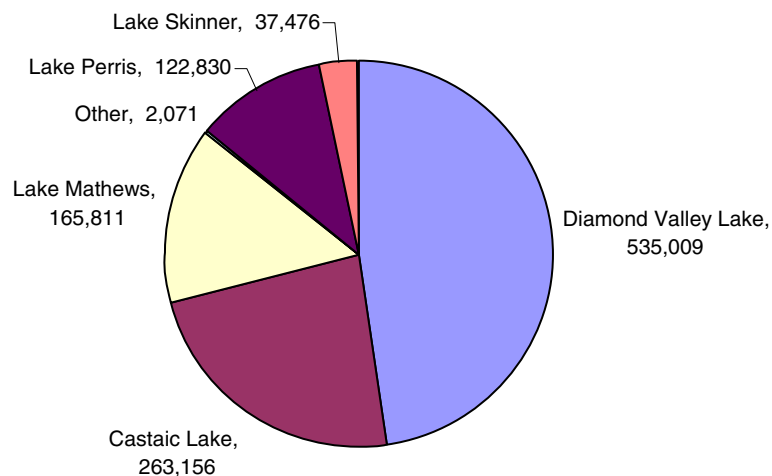
Construction of Southern California's newest and largest reservoir nearly doubled the area's surface water storage capacity. Transport of imported water to the lake began in November 1999, and the lake reached capacity in early 2003. Diamond Valley Lake holds 800 taf, some of which is for dry-year and seasonal storage, and the remainder for emergency storage.

#### SWP Terminal Reservoirs

Under the 1994 Monterey Agreement, Metropolitan received operational control of 218,940 af in the reservoirs at the southern terminals of the California Aqueduct. This control gives Metropolitan greater flexibility in handling supply shortages.

Figure III-4 shows that the level of Metropolitan dry year and seasonal storage water in Metropolitan or DWR reservoirs in Southern California as of December 2004 exceeds 1 million af. This figure is less than the total amount of water Metropolitan has in storage because it does not include emergency supplies.

**Figure III-3**  
**Surface Reservoirs in Southern California**  
**Metropolitan Seasonal/Carryover Storage**  
**December 2004**



## ***B. Groundwater Storage***

Many local groundwater storage programs have been implemented over the years to maximize the use of local water supplies. These programs have included the diversion of water flows into percolation ponds for artificially recharging groundwater basins and the recovery of degraded groundwater, and they have increased production in all types of years.

- For many years, flood control agencies within Metropolitan's service area have captured and spread storm water for groundwater replenishment. Local runoff and reclaimed water have been conserved in spreading grounds, injection wells, reservoirs, and unlined river channels. In addition, flood control agencies have operated seawater barrier projects in Los Angeles and Orange Counties to prevent seawater intrusion into the coastal groundwater basins.
- In the past, growing water quality problems raised serious concerns about the ability to sustain average annual production levels. The federal Superfund program, although slow to implement clean-up projects, has helped maintain or increase the usable groundwater. These increased levels have been augmented by water recovery projects discussed in Chapter III.3.

Conjunctive use of the aquifers offers an even more important source of dry year supplies. Unused capacity in Southern California groundwater basins can be used to optimize imported water supplies, and the development of groundwater storage projects will allow effective management and regulation of the region's major imported supplies from the Colorado River and Bay/Delta region. To meet the adopted targets for dry year storage, Metropolitan and its member agencies have encouraged the recharge of the groundwater basins. Over the years, Metropolitan has implemented conjunctive water use through various incentive programs. Typically this storage takes place in one of two ways:

Direct deliveries to storage — Metropolitan delivers replenishment or banked water directly to water storage facilities, including spreading sites and injection wells.

In-lieu deliveries to storage — Metropolitan delivers replenishment water directly to the member agency's distribution system. The member agency then delivers this water rather than producing water from local sources. The deferred local production results in water being left in local storage (surface or groundwater) for future use.

Metropolitan has developed a number of local programs to work with its member agencies to increase storage in groundwater basins. In the past, Metropolitan encouraged storage through its cyclic and seasonal storage programs. Metropolitan can currently draw on 20 taf per year of dry-year supply from cyclic storage accounts with several member agencies. These agreements allow Metropolitan to deliver replenishment water into a groundwater basin in advance of agency demands. Agencies can then transfer water from storage accounts when they incur a replenishment obligation to the basin. These types of agreements have been in place since the early 1970s but may be closed by 2020. Today Metropolitan is concentrating on long-term replenishment storage programs and contractual conjunctive use programs.

The following sections describe these programs in more detail.

### *Long term Replenishment Storage*

To encourage member agencies to participate in this program, Metropolitan offers replenishment water at reduced rates. Table III-18 displays the Tier 1 charges for full service and compares them to the replenishment charges.

**Table III-18**  
**Selected Metropolitan Water Rates,**  
**Effective 1/1/2005**

<b>Rate category</b>	<b>Charge per AF</b>
<i>Tier 1 Full Service</i>	
Untreated full service	\$331
Treated full service	\$443
<i>Replenishment Service</i>	
Untreated replenishment service	\$238
Treated replenishment service	\$325

### North Las Posas

In 1995, Metropolitan entered into an agreement with Calleguas Municipal Water District to develop facilities for storage and extraction in the North Las Posas Basin in Ventura County. The agreement gives Metropolitan the right to store up to 210,000 af of water in the North Las Posas Groundwater Basin. Phase 1 and 2 wellfields (18 ASR wells) have been completed and are online. The wellfields are expected to be fully operational in 2007 after the completion of the Moorpark pipeline pumpstation by the Calleguas MWD. At that stage, the project will be able to pump 47 TAF per year from the basin. As of June 30, 2005, 48 taf are in storage. With temporary pumps in place, approximately 20 taf could be extracted in 2005 if needed.

### Proposition 13 Projects

In 2000, the Department of Water Resources (DWR) made available local assistance grant funds that were provided under Proposition 13. Metropolitan was selected to receive \$45 million from the disbursement to help fund the Southern California Water Supply Reliability Projects Program. Metropolitan is using that \$45 million for groundwater conjunctive use projects within its service area. These projects will allow storage of imported water in wet years for use in dry years. To select which projects to invest in, Metropolitan used a competitive Request for Proposals (RFP) process designed to fund projects with the most potential for success under Metropolitan's conjunctive use principles. Since 2001, Metropolitan's staff worked to coordinate the eight conjunctive use programs selected through this process. These projects are described in Table III-19.

**Table III-19  
Conjunctive Groundwater Projects Selected Through The RFP Process**

<b>Project and Project Proponents</b>	<b>Storage Capacity (TAF)</b>	<b>Dry-Year Yield (TAF/Year)</b>	<b>Balance as of 12/31/2004 (TAF)</b>	<b>Design/ Construction Status</b>
<b>LOS ANGELES COUNTY</b>				
<b>Long Beach Conjunctive Use Project (CUP)</b> CBMWD and Long Beach	13.0	4.3	13.0	Completed
<b>Foothill Area GW Storage Project</b> Foothill MWD	9.0	3.0	2.0	Started
<b>Long Beach CUP: Expansion in Lakewood</b> CBMWD and Long Beach	3.6	1.2	0	Executed Agreement
<b>City of Compton Conjunctive Use Program</b> City of Compton	2.3	0.8	0	Design
<b>Upper Claremont Heights Conjunctive Use</b> Three Valleys MWD	3.0	1.0	0	In Approval Process
<b>ORANGE COUNTY</b>				
<b>Orange County GW Conjunctive Use Program</b> OCWD, MWDOC	60.0	20.0	18.8	Under construction
<b>SAN BERNARDINO COUNTY</b>				
<b>Chino Basin Programs</b> IEUA, Chino Basin Watermaster	100.0	33.0	37.8	Design and Construction
<b>Live Oak Basin Conjunctive Use Project</b> Three Valleys MWD	3.0	1.0	0.3	Under Construction
<b>Total</b>	193.9	64.3		

#### Raymond Basin

Metropolitan is currently working with member agencies and the Raymond Basin Management Board to develop an additional conjunctive use agreement in Raymond Basin. In January 2000, the Metropolitan Board authorized entering into agreements with the City of Pasadena and Foothill MWD to implement the groundwater storage program contingent upon satisfactorily completing all necessary environmental documentation. The Board also appropriated funds to conduct initial environmental, engineering, and planning studies. The program is expected to yield 22 taf per year by 2010.

#### Other Programs

Metropolitan intends to extend these conjunctive use programs and add another 80 taf or more to groundwater storage. Metropolitan expects that some of its existing programs may be able to be expanded beyond the capacity under the current contracts. In addition, the Central and West Coast basins, located within Los Angeles County, are being reviewed to identify the potential for groundwater storage programs and the governance structures that would be needed to manage such programs. In addition, storage programs in the San Fernando and San Jacinto basins, as well as in the city of San Diego, are being considered.

## **Achievements to Date**

Table III-20 summarizes the local groundwater storage identified and contracted under the local storage programs. It shows that Metropolitan has identified almost all of the 300 taf dry year supplies set as a goal for groundwater storage within the region. It also shows that additional potential programs could be pursued if required. With the completion of Diamond Valley Lake, Metropolitan has achieved its surface storage goals for the 2025 time frame. Thus, Metropolitan has identified projects that will enable it to achieve its goals for local storage, and has implemented programs that provide the majority of that storage. For 2030 projections, Metropolitan has assumed that all programs projected to be in place in 2025 will remain in place.

**Table III-20**  
**In-Region Groundwater Storage Status**  
**2020 & 2025 (TAF)**

Project	Annual Supply	Project Status
Long-term Replenishment and Cyclic	86	Current
North Las Posas	47	Current
<u>Proposition 13 Programs</u>	64	Current
City of Long Beach		
Inland Empire		
Orange County		
Foothill		
Three Valleys		
Compton		
Long Beach – Lakewood		
<u>Proposition 13 Programs (in progress)</u>	~3	Under Development
San Diego County		
Upper Claremont		
Raymond Basin	22	Under Development
<u>Additional Programs</u>	80 or more	Under Development
<i>Expansion of existing programs</i>		
Chino Basin Storage Program		
Expansion		
Orange Co Basin Storage		
Program Expansion		
North Las Posas Phase 3		
<i>New programs</i>		
Central Basin Storage Program		
West Basin Storage Program		
San Fernando Basin Storage		
Program		
San Jacinto Basin Storage		
Program		
City of San Diego Storage		
Program		
Other new programs		
<b>Total</b>	<b>300</b>	

Note: “Current” signifies that contracts are in place, not necessarily that facilities are constructed or water in storage. “Under Development” signifies that programs have been identified and negotiations commenced, but that feasibility, environmental analysis or contractual agreements are not yet finalized.

### **III.5 STATE WATER PROJECT**

#### **IRP Goals**

In 1999, Metropolitan's Board of Directors set new goals for the State Water Project (SWP) with the adoption its CALFED Policy Principles. These goals committed Metropolitan to water quality objectives, the development of a 650 taf minimum dry-year supply from the SWP by 2020, and average annual deliveries of 1.5 maf (excluding transfers and storage programs along the SWP). To achieve these goals while minimizing impacts to the Bay-Delta ecosystem, Metropolitan would maximize deliveries to storage programs during wetter years. It would also work with others to implement a number of source-water quality and supply reliability improvements in the Delta, remove operational conflicts with the Central Valley Project (CVP), and better coordinate planning and operations between the SWP and CVP.

#### **System Description**

The SWP consists of a series of pump stations, reservoirs, aqueducts, tunnels, and power plants operated by California's Department of Water Resources (DWR). Figure III-6 shows SWP facilities. This statewide water supply infrastructure provides water to 29 urban and agricultural agencies throughout California. The original State Water Contract called for an ultimate delivery capacity of 4.2 maf, with Metropolitan holding a contract for 2,011 taf.

More than two-thirds of California's drinking water, including all of the water supplied by the SWP, passes through the San Francisco-San Joaquin Bay-Delta (Bay-Delta). For decades, the Bay-Delta system has experienced water quality and supply reliability challenges and conflicts due to variable hydrology and environmental standards that limit pumping operations.

#### **Issues**

Prior to the 1994 Bay-Delta Accord, the reliability of SWP deliveries was deteriorating rapidly. Based on an analysis of the State Water Resources Control Board's (SWRCB) draft water rights decision 1630, Metropolitan estimated that by 2005 its SWP delivery would be reduced to 171 taf – about 8.5 percent of its SWP contract entitlement -- under hydrologic conditions comparable to 1977, the driest year on record for the SWP. The SWRCB subsequently withdrew draft water rights decision 1630, and the Bay-Delta Accord, through SWRCB water rights decision 1641, established new operating criteria for the SWP. Under these new criteria, DWR projects that SWP delivery in critically dry years would increase to 418 taf – about 21 percent of Metropolitan's SWP contract entitlement.

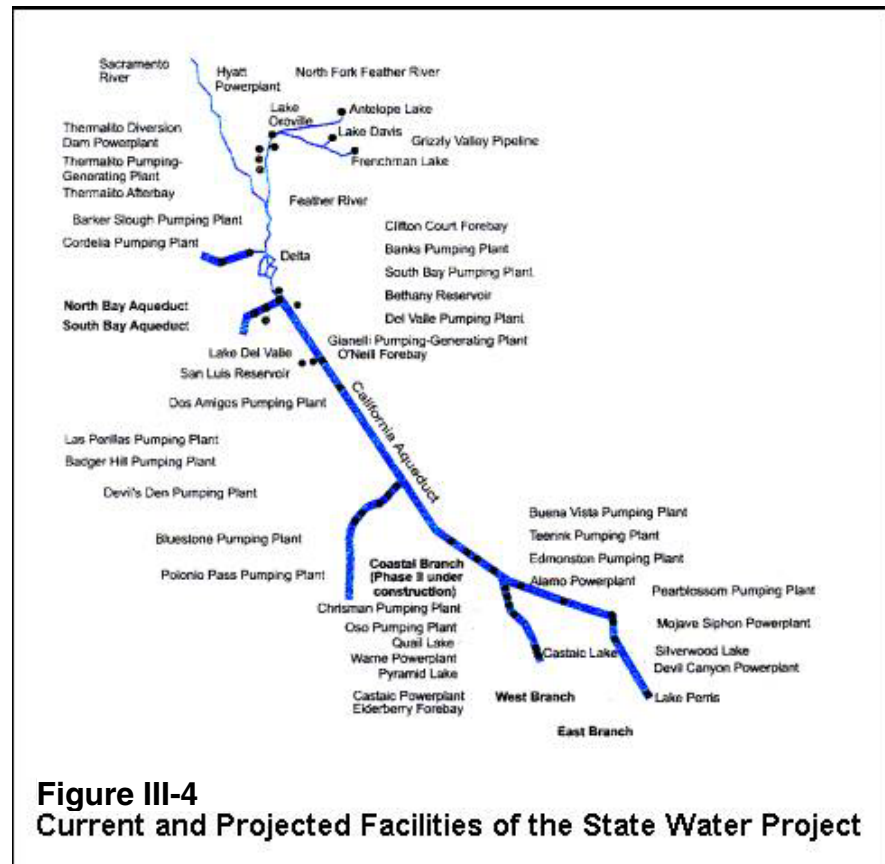
To achieve Metropolitan's overall supply reliability objectives, the yield from the SWP during critically dry years would need to increase to 650 taf by 2020, and annual deliveries (excluding transfer and storage programs along the SWP) needed to average 1.5 million acre-feet per year.

Moreover, Metropolitan would meet its supply reliability goals only if it has access to SWP supplies up to its full contracted amount during wet years to replenish surface and groundwater storage.

Sustained improvement in SWP water quality is also an important issue for Metropolitan.

Metropolitan must be able to meet the increasingly stringent drinking water regulations that are expected for disinfection by-products and pathogens in order to protect public health. Meeting these regulations will require improving the Delta water

supply by cost effectively combining alternative source waters, source improvement, and treatment facilities. Additionally, Metropolitan requires water quality improvements of Delta water supplies to meet its 500 mg/L salinity blending objective in a cost-effective manner, while minimizing resource losses and helping to ensure the viability of regional recycling and groundwater management programs.



## Changed Conditions

Since the 2000 RUWMP, conditions affecting the future operations of the SWP have changed. In August 2000, state and federal resources and environmental protection agencies approved the CALFED Record of Decision (ROD) for the Programmatic Environmental Impact Report/Impact Statement. The ROD identifies implementation plans for the first seven years of what is expected to be a 30-year improvement program in the Bay-Delta. A number of projects identified in the ROD relate to the conveyance capacity, water quality, and operation of the SWP.

In 2003, the California Bay-Delta Act established the Bay Delta Authority as the new governance structure for the CALFED Program. Its responsibilities include providing accountability, ensuring balanced implementation, and tracking and assessing Program progress. It also helps to coordinate actions taken by CALFED Implementing Agencies, including the California Department of Water Resources, which operates the SWP.

Also in 2003, the DWR, the United States Bureau of Reclamation (USBR), and State and Federal water contractors addressed joint operational issues. These planning and operational activities set the stage for the development of the proposed Delta Improvement Package of 2004, which outlines actions related to water project operations in the Delta. These actions would result in increased water supply reliability, improved water quality, environmental protection and ecosystem restoration, protection of the Delta Levee system, and improved real-time and long-term management. The Delta Improvements Package also outlines conditions under which the SWP would be allowed to increase its permitted export pumping capacity from 6,680 to 8,500 cubic feet per second (cfs) at the Banks Pumping Plant in the Delta, a key requirement to achieving Metropolitan's supply reliability objectives.

Under the current proposal, the CALFED Implementing Agencies would be required to report on the status of actions and linkages in the Delta Improvements Package annually to assure proper balanced implementation and success.

In May 2005, DWR issued to SWP contractors excerpts from its Draft SWP Delivery Reliability Report due to be released later in the year. These excerpts contained results from seven studies of SWP reliability. The first three studies replicated modeling done by DWR for its 2003 SWP Delivery Reliability Report. Studies 4 and 5 reflected changes in CVP/SWP operations consistent with the CVP/SWP Operations Criteria and Plan (OCAP). The last two studies, 6 and 7, were similar to studies 4 and 5 but also included updated SWP demand projections developed in consultation with SWP contractors. DWR recommended SWP contractors use results from studies 6 and 7 for their UWMPs.

In studies 6 and 7, SWP delivery capability under single-dry year conditions similar to 1977 shows a dramatic decrease compared to DWR's previous reliability estimates. DWR's 2003 SWP Delivery Reliability Report estimated a minimum delivery capability of 830 taf. Under the new OCAP and SWP demand assumptions, minimum delivery capability ranged between 159 taf (Study 6) and 187 taf (Study 7), a nearly 80 percent drop in delivery capability. DWR listed several attenuating circumstances that would likely result in their models overstating the drop in single dry-year SWP delivery capability. These circumstances included conservative assumptions about San Luis Reservoir minimum pool and carryover storage. According to DWR, relaxing these assumptions to better reflect how the SWP would actually be operated during a single dry year could, under some circumstances, increase delivery capability by as much as 650 taf. Thus, DWR's Draft SWP Delivery Reliability Report findings appear to place SWP single dry year delivery capability somewhere between 159 taf and 837 taf.

Metropolitan incorporated DWR's draft results into its planning models for SWP operations and concluded that delivery capability for SWP water delivered to Metropolitan for a single dry year like 1977 would be about 175 taf of Table A delivery plus about 280 taf of carryover storage delivery. For multiple dry years, similar to the period 1990-1992, annual SWP deliveries to Metropolitan would average about 509 taf of Table A water and about 93 taf of carryover storage. Previous DWR assessments of SWP delivery reliability had led Metropolitan to plan for SWP Table A deliveries of about 415 taf under a single dry year scenario like 1977 and about 830 taf under a multiple dry year scenario like 1990-1992. DWR's updated assessment of SWP delivery capability has caused Metropolitan to make a significant downward revision to previous estimates of Table A delivery for single and multiple dry year hydrology.

## **Implementation Approach**

Metropolitan's implementation approach for the SWP depends on the full use of the current State Water Contract provisions, including its basic Table A supply contract amount, Article 21 interruptible supplies, and Turnback Pool supply provisions. In addition, it requires successful negotiation and implementation of a number of agreements, including CALFED, the Sacramento Valley Water Management (Phase 8 Settlement) Agreement, and the Delta Improvement Package. Each of these stakeholder processes or agreements involves substantial Metropolitan and member agency staff involvement to represent regional interests. Metropolitan is committed to working collaboratively with DWR, SWP contractors, and other stakeholders to ensure the success of these extended negotiations and programs.

### ***SWP Reliability***

This section provides details of the major actions Metropolitan is undertaking to improve SWP reliability:

#### Delta Improvements Package and Phase 8 Settlement

Ensuring that the Delta Improvements Package is successfully implemented is a key component of Metropolitan's approach for increasing SWP supply reliability. The Delta Improvement Package is a set of linked actions designed to allow the SWP to operate the Banks Pumping Plant in the Delta at 8,500 cfs, provided all regulatory standards are met and water is available for export. The Banks Pumping Plant is currently limited by a Corps of Engineers permit to operate at 6,680 cfs, with provision to pump at higher levels only under very limited hydrologic conditions.

The key benefits of the proposed Delta Improvement Program for urban Southern California include:

- Increased water supply for regional groundwater and surface water storage initiatives (130 taf per year);
- Enhanced access to voluntary water transfers upstream of the Delta as foreseen in the Record of Decision;
- Continued Endangered Species Act assurances and supply reliability through implementation of a long-term Environmental Water Account;
- Achievement of SWP supply goals for 2020 adopted by the Metropolitan Water District Board in the Southern California IRP; and
- Enhanced operation of the diversified portfolio of supplies developed over the past decade in the IRP.

Metropolitan also has been working with Bay-Delta watershed users toward settlement on how all Bay-Delta water users would bear some of the responsibility of meeting flow requirements. In December 2002, all of the parties signed a settlement agreement known as "The Sacramento Valley Water Management Agreement" or "Phase 8 Settlement Agreement." The agreement resulted from the SWRCB Bay-Delta Water Rights Phase 8 proceedings. It includes work plans to develop and manage water resources to meet Sacramento Valley in-basin needs,

environmental needs under the SWRCB's Water Quality Control Plan, and export supply needs for both water demands and water quality. The agreement specifies about 60 water supply and system improvement projects by 16 different entities in the Sacramento Valley. Its various conjunctive use projects will yield approximately 185 taf per year in the Sacramento Valley, and approximately 55 taf of this water would come to Metropolitan through its SWP allocation. The Agreement specifies a supply breakdown of 110 taf (60 percent) to the SWP and 75 taf (40 percent) to the CVP.

Based on the work plans for CALFED's Bay-Delta Program and the Sacramento Valley Management Agreement, potential annual and dry-year supply capabilities are projected to be 55 taf in 2010, 55 taf in 2015, and 110 taf beyond 2015.

#### Monterey Amendment

The Monterey Amendment, executed by DWR and most of the State Water Contractors in 1995 and 1996, primarily addressed the allocation of SWP water in times of shortage, and it dealt with a number of other issues that facilitated more flexibility for SWP contractors. Though challenged in court, a settlement has been reached and a revised Environmental Impact Report is being prepared. The Monterey Amendment enables Metropolitan to use a portion of the San Luis Reservoir's capacity for carryover storage into the subsequent calendar year, which increases SWP annual delivery by 93 taf to 285 taf, depending on supply conditions.<sup>1</sup>

#### SWP Terminal Storage

Metropolitan has contractual rights to 65,000 af of flexible storage at Lake Perris (East Branch terminal reservoir) and 153,940 af of flexible storage at Castaic Lake (West Branch terminal reservoir). This storage provides Metropolitan with additional options for managing SWP deliveries to maximize yield from the project. Over multiple dry years it can provide Metropolitan with 73 taf of additional supply. In a single dry year like 1977 it can provide up to 219 taf of additional supply to Southern California.

#### Desert Water Agency/Coachella Valley WD SWP Table A Transfer

Under the transfer agreement Metropolitan transferred 100 taf of its SWP Table A amount to Desert Water Agency/Coachella Valley WD (DWCV). Under the terms of the agreement DWCV pays all SWP charges for this water, including capital costs associated with capacity in the California Aqueduct to transport this water and variable costs to deliver this water to Perris Reservoir. The amount of water actually delivered in any given year depends on that year's SWP allocation. Water is delivered through the existing exchange agreements between Metropolitan and DWCV. While Metropolitan transferred 100 taf of its Table A amount, it retained other rights, including interruptible water service; its full carryover amounts in San Luis Reservoir; its full use of flexible storage in Castaic and Perris Reservoirs; and any rate management credits associated with the 100 taf. In addition, Metropolitan is able to recall the SWP transfer water in years in which Metropolitan determines it needs the water to meet its water management goals. The main benefit of the agreement is to reduce Metropolitan's SWP fixed costs in wetter years when there are more than sufficient supplies to meet Metropolitan's water management goals, while at the same time preserving its dry-year SWP supply. In a single critically dry-year like 1977 the call-back provision of the entitlement transfer can provide

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<sup>1</sup> This includes DWCV carryover that would flow to Metropolitan through exchange agreements with Desert Water Agency and Coachella Valley Water District.

Metropolitan about 5 taf of SWP supply. In multiple dry years like 1990-1992 it can provide Metropolitan about 26 taf of SWP supply.

#### Desert Water Agency/Coachella Valley WD Advance Delivery Program

Under this program, Metropolitan delivers Colorado River water to the Desert Water Agency and Coachella Valley WD in exchange for their SWP Contract Table A allocations. Metropolitan can make advance deliveries of Colorado River water under the terms of the agreement with these agencies. By making advance deliveries, Metropolitan is able take DWCV SWP Table A allocation in dry years without having to deliver an equivalent amount of Colorado River water so long as there is enough advance delivery water to cover Metropolitan's exchange obligation. This program allows Metropolitan to maximize delivery of SWP and Colorado River water in dry years. The advance delivery provision increases SWP Table A deliveries to Metropolitan by about 6 taf in a single dry-year like 1977 and by about 18 taf in multiple dry years similar to the period 1990-1992. These increases in dry-year Table A deliveries are incorporated into the estimate of SWP Deliveries under Current Programs shown in Table III-21.<sup>2</sup>

Table III-21 summarizes Metropolitan's SWP supply range for 2025 based on these changes. When interpreting the SWP dry year supply projections shown in this table, it is important to note that the estimates of zero dry year supply from Delta Improvements can be misleading. The primary supply benefit of Delta Improvements will be the ability to increase SWP pumping during average and wet years and storing this water for subsequent use in dry years. This increase in stored water available for dry year delivery is reflected in the projections of dry year supply for local and Central Valley storage programs discussed in Chapters III-4 and III-6.

#### ***SWP Water Quality***

Metropolitan requires a safe drinking water supply from the Bay-Delta to meet current and future regulatory requirements for public health protection. Finding cost-effective ways to reduce total organic carbon (TOC), bromide concentrations, pathogenic microbes, and other unknown contaminants from Bay-Delta water supply is one of Metropolitan's top priorities. Metropolitan also requires a SWP supply that is consistently low in salinity — Total Dissolved Solids (TDS) — so it can blend SWP water with higher-salinity Colorado River water to achieve salinity goals for its member agencies. In addition, Metropolitan needs consistently low-salinity SWP water to increase in-basin water recycling and groundwater management programs. These programs, essential to the successful implementation of the IRP, require that blended water meet TDS thresholds.

The Delta Improvement Package offers important water quality benefits to Metropolitan. In particular, levee modifications at Franks Tract and other source control actions may significantly reduce ocean salinity concentrations in Delta water, which would benefit Delta water users and export interests alike.

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<sup>2</sup> 18 taf out of a total of 509 taf SWP annual delivery for a multiple dry-year event similar to the period 1990-1992 are due to the DWCV advance delivery provision. For a single-dry year similar to 1977, 6 taf out of a total of 175 taf are due to the advance delivery provision.

**Table III-21**  
**SWP Supply Projection: 2025**  
**(TAF)**

<b>Hydrology</b>	<b>Multiple Dry Years (1990-1992)</b>	<b>Single Dry Year (1977)</b>	<b>Average Year (1922-2004)</b>
<b>Current Programs</b>			
SWP Deliveries <sup>1</sup>	509	175	1,472
San Luis Carryover <sup>2</sup>	93	280	280
SWP Call-back of DWCV Table A Transfer	26	5	0
SWP Terminal Storage <sup>4</sup>	73	219	0
<b>Subtotal of Current Programs</b>	<b>701</b>	<b>679</b>	<b>1,752</b>
<b>Programs Under Development</b>			
Delta Improvements <sup>3</sup>	0	0	130
Phase 8 Agreement	110	110	110
<b>Subtotal of Proposed Programs</b>	<b>110</b>	<b>110</b>	<b>240</b>
<b>Maximum Supply Capability</b>	<b>811</b>	<b>789</b>	<b>1,992</b>

Notes:

1. Includes 76 taf of additional SWP supplies in 1977 per DWR and DWCV Table A supplies in multiple and single dry years.
  2. Includes DWCV carryover.
  3. Includes increasing Banks pumping capacity to 8,500 cfs.
  4. SWP terminal storage is shown in the In-Basin Storage Activities tables in Appendix A.3.
- \* Appendix A.3 includes SWP supply projections for 2010, 2015, and 2020.

Franks Tract is an island located in the central Delta that was actively farmed until levee breaches in 1936 and 1938. Since 1938, the tract has remained a flooded island and its levees remain in disrepair. Tidal flows in the Delta entrap saline ocean water in the flooded tract, resulting in degraded water quality for both in-delta and export users. Recent computer modeling analyses by Metropolitan, DWR, and the US Geological Survey indicate that reducing this salinity intrusion by partially closing existing levee breach openings and/or building radial gate flow control structures will significantly reduce TDS and bromide concentrations in water from the Delta during the summer and fall months and in drought years. Based on Metropolitan's analysis, improvements to Franks Tract alone could reduce peak bromide concentrations in the summer and fall months by about 33 percent at Contra Costa Water District's (CCWD) Rock Slough intake, by 27 percent at CCWD's Old River intake, and by 24 percent at the SWP intake in the South Delta. At the same time, increasing Banks Pumping Plant capacity to 8,500 cfs would allow the diversion of a larger proportion of water supplies during periods of good water quality.

In addition to the Delta Improvement Package, the CALFED Program is coordinating several SWP water quality feasibility studies and projects. These include a) a feasibility study on water quality improvement in the California Aqueduct and b) the conclusion of feasibility studies and demonstration projects under the currently funded Southern California-San Joaquin Regional Water Quality Exchange Project. With respect to the latter project, the Friant Water Users Authority (FWUA) and Metropolitan have entered into a partnership, based on an approved set of principles, to investigate the potential of enhancing the quantity and affordability of the eastern San Joaquin Valley's water supply while improving Southern California's water quality.

The FWUA and Metropolitan are studying possible projects that would benefit each region while creating no adverse impacts. A pre-feasibility study of existing conditions and potential constraints was completed in 2003. Similar studies are underway with the Kings River Water Association.

### ***SWP System Outage and Capacity Constraints***

As its infrastructure ages, the SWP becomes increasingly vulnerable to natural disasters, particularly the Delta levee system and the California Aqueduct, which are both susceptible to floods and earthquakes. In June 2004, a levee in the Jones Tract of the Delta failed, resulting in total inundation of the island and disrupting SWP operations. Catastrophic loss of either the Delta levee system or the aqueduct would shut down the project, affecting the welfare of millions. While Metropolitan has made substantial investments in local resources and in-basin storage to insulate Southern California against loss of its imported water supplies, additional investment is needed in the at-risk infrastructure.

The CALFED Levees Program coordinates Delta levee maintenance and improvement activities. Its goal is to protect water supplies needed for the environment, agriculture and urban uses by reducing the threat of levee failure and seawater intrusion. Over the next two to three years, CALFED Implementing Agencies will carry out a Comprehensive Program Evaluation (CPE). It will incorporate the risk study that has been commissioned by DWR, including the currently-proposed expanded scope of that study. The CPE will: a) supplement the DWR risk study to ensure that it considers all relevant levee risks, b) include the development of a formal strategic plan that contains a description of any proposed future program changes, and c) recommend priorities and estimate funding needs for the Levees Program. For example, the P.L. 84-99 ROD target will be reevaluated as part of the CPE using information from the Risk Study.

The California Aqueduct remains susceptible to floods at several points as it travels from the Delta along the west side of the San Joaquin Valley. Key among these is where the Aqueduct crosses the Arroyo Pasajero, an alluvial fan located near Coalinga, California. At that spot, the Aqueduct effectively forms a barrier to Arroyo flood flows. Although flood control facilities were built to protect the Aqueduct, the volumes of runoff and sediment deposition are much greater than originally estimated, so a significant flood risk remains. The Aqueduct was severely damaged during March of 1995 when a flood overwhelmed control facilities and overtopped the Aqueduct with 10 taf of floodwater and an estimated 800,000 cubic yards of sediment. Impacts to downstream water users lasted through the summer of 1995. In December of 2004, DWR began construction of “Phase I” improvements to the Aqueduct where it crosses the arroyo. These improvements will increase the size of the detention basins west of the aqueduct to protect it against a 50-year storm event.

DWR is also investing in the replacement of aging SWP infrastructure critical to SWP operations. It is midway into its Turbine Rehabilitation Program at Oroville Reservoir’s Hyatt-Thermalito complex. In 2004 DWR awarded a contract to replace four pumps at the Edmonston Pumping Plant in the Delta. Moreover, improved maintenance procedures have decreased the amount of time pumps at Edmonston come off-line for maintenance to less than 10 percent of the time they would otherwise be available for operation.

Because of the risk of a prolonged shutdown of the SWP caused by seismic or hydrologic events either within the Delta or along the Aqueduct, Metropolitan has acted decisively to ensure that Southern California has adequate emergency storage. Diamond Valley Lake and SWP terminal reservoir storage are jointly capable of providing the region with a six-month supply of water if combined with a temporary 25 percent reduction in demand. Metropolitan engineering studies indicate this would provide sufficient time to repair the SWP and resume delivery.

## **Achievements to Date**

### ***SWP Reliability***

The discussions initiated in July 2003 at Napa between SWP and CVP contractors to resolve inter-project operational conflicts set the stage for the development of the proposed Delta Improvement Package of 2004. The primary focuses of the Napa discussions were better integration of the operations of the SWP and CVP and the development of joint planning assumptions and support for the advancement of CALFED. Key features of the proposal that resulted from the discussions include:

- Consistent Planning Assumptions. Previously, DWR and USBR made inconsistent planning assumptions in their various Delta-related activities. These assumptions created a significant problem for CALFED, which seeks to coordinate activities among agencies. A proposal drafted at Napa aligns the planning activities of the two project operators and provides for timely permitting of CALFED through-Delta improvements.
- Project Integration Plan. The project operators and their contractors agreed to better integrate project operations, allowing both projects to get more out of the existing water supply system, consistent with environmental restoration and water quality improvement goals. In essence, the Napa proposition provides for operation of SWP conveyance to benefit CVP contractors and operation of CVP storage to benefit SWP contractors. Through innovative integration of CVP-SWP operations, both groups of contractors would be able to improve supply reliability in a manner consistent with the CALFED ROD.
- Better Risk Management. The Napa proposition provides for better management of risk in project operations. For example, provisions allowing the SWP to “borrow” storage capacity in CVP facilities under specified conditions would allow the SWP to allocate higher amounts of water earlier in the year, a valuable improvement even if ultimate deliveries are generally unaffected. Similarly, an agreement to shift responsibility for protecting the “low-point” in San Luis Reservoir from the CVP to the SWP would provide for significant increases in CVP allocations earlier in the water year, increasing certainty for the annual business plans of CVP agricultural water users.
- Through-Delta Facility Improvements. The Napa discussions solidified support for CALFED plans to improve through-Delta facilities, including: (a) implementation of the South Delta Improvement Program that would increase pumping capacity at the SWP Banks Pumping Plant to 8,500 cubic feet per second; and (b) construction and operation of an intertie between the Delta Mendota Canal and the California Aqueduct.

Collectively, the actions proposed in the Napa discussions can significantly improve water supply reliability in a manner consistent with other CALFED objectives. In particular, the through-Delta physical improvements included in the CALFED ROD provide considerable flexibility for meeting water management challenges in the driest years. Expanding the capacity of the SWP Banks pumping plant increases the ability to store water south-of-the-Delta during wet periods. Withdrawing that water during dry periods relieves dry-year pressure on the environment and other Delta water users. In addition, this increased conveyance capacity adds to the ability to transport conserved water from voluntary sellers upstream of the Delta to buyers seeking additional supplies south of the Delta.

As an outcome of the Napa discussions, representatives of DWR, USBR, the California Department of Fish and Game (DFG), the United States Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS) developed a proposal for a long-term Environmental Water Account (EWA). The proposal provides for improvements in EWA “fixed assets” that include purchases of water from willing sellers. It also proposes a long-term commitment to allow EWA to borrow storage in San Luis Reservoir, an approach successfully employed on an ad-hoc basis for the past three years. In addition, the long-term EWA would provide EWA managers with control over groundwater storage and other assets to better manage their resources and protect and restore fisheries in a more cost-effective manner.

Additional meetings, held in Stockton, addressed the concerns of Delta interests regarding project operations. While discussions are still underway, these meetings suggest that a common package of actions can be implemented that provides water supply and water quality benefits to export interests, protects the interests of Delta water users, and continues the process of environmental restoration.

### ***SWP Water Quality***

The most significant achievement for SWP water quality has been continued definition and advancement of the Delta Improvement Package. Most notably, the Franks Tract studies identified cost-effective ways to achieve significant improvements in the quality of Delta export water. The Franks Tract project will be implemented in phases, with the first phase scheduled to begin in 2006.

Progress also is being made on the Southern California-San Joaquin Regional Water Quality Exchange Project. In May 2003, SAIC Engineering, Inc. completed its pre-feasibility assessment establishing baseline conditions and water management needs for the project.

### ***SWP System Reliability***

The completion and filling of Diamond Valley Lake marked the most important achievement with respect to protecting Southern California against an SWP system outage. Water began pouring into the reservoir in November 1999 and the lake was filled by early 2003. The lake can hold up to 800 taf that provides Southern California with a six-month emergency water supply as well as carryover and regulatory storage.

### ***East Branch Enlargement***

In 1986, Metropolitan and other State Water Project (SWP) contractors entered into an agreement with the DWR to enlarge the capacity of the SWP East Branch Aqueduct from the Alamo Powerplant to the Devil Canyon Powerplant. The agreement specified a staged enlargement of approximately 1500 cfs, with Metropolitan receiving an increase of 1200 cfs. Phase I of the enlargement, which provides approximately 750 cfs, began immediately and was completed in 1992. Phase II was deferred until the build-up in water demands warranted it. Metropolitan and the other East Branch Enlargement contractors are currently in discussions with DWR regarding Phase II planning and timing. Phase II would provide additional supplies and reliability for Metropolitan's eastern service area, including the Inland Empire and San Diego. Current Metropolitan demand projections indicate that Phase II will not be needed until 2015 or later.

## **III.6 Central Valley Storage and Transfer Programs**

### **IRP Goals**

The 1996 IRP established a major goal of increasing the reliability of supplies received from the California Aqueduct by developing flexible Central Valley storage and transfer programs. Since adopting the 1996 IRP, Metropolitan has developed numerous voluntary Central Valley storage and transfer programs, aiming for a dry-year water resource development target of 300 taf by 2010. The IRP Update maintains the same target. By 2003, Metropolitan had enough Central Valley storage and transfer programs in place to meet the 300 taf target.

### **Description**

To date, Metropolitan's Central Valley storage programs consist of partnerships with Central Valley agricultural districts. These partnerships allow Metropolitan to store its State Water Project (SWP) supplies during wetter years for return in future drier years. Metropolitan's Central Valley transfer programs consist of partnerships with Sacramento Valley Central Valley Project (CVP) and SWP settlement contractors, and they allow Metropolitan to purchase water in drier years for delivery via the California Aqueduct to Metropolitan's service area.

### **Issues**

Before the 1994 Bay-Delta Accord, SWP delivery reliability was deteriorating rapidly. To gain a clearer picture of the extent of the deterioration, Metropolitan carried out an analysis based on the State Water Resources Control Board's (SWRCB) draft water rights decision 1630. This analysis showed that by 2005, if the hydrologic conditions were comparable to those of the driest year on record, 1977, Metropolitan's SWP delivery would be reduced to 171 taf, which is only about 8.5 percent of its SWP contract entitlement.

The SWRCB later withdrew draft water rights decision 1630 and the Bay-Delta Accord established new operating criteria for the SWP. Metropolitan again analyzed these new criteria to estimate the potential water deliveries in critically dry years. Under these criteria, SWP deliveries to Metropolitan, not counting carryover storage, increased to 418 taf, which is about 21 percent of its SWP contract entitlement. Metropolitan's Board determined that while the new criteria established by the Bay-Delta Accord represented an improvement in SWP reliability, they were not, of themselves, sufficient to meet Metropolitan's overall supply reliability objectives. Moreover, DWR's most recent estimates of SWP delivery capability, which they released to SWP contractors in May 2005, show that SWP reliability under conditions similar to 1977 could be far worse than earlier modeling indicated. Based on these new DWR reliability projections, Metropolitan estimates that in a single-dry year similar to 1977, SWP deliveries to its service area would be about 175 taf rather than 418 taf of Table A water. Metropolitan estimates another 280 taf of carryover storage could be delivered, for a total delivery of 455 taf.

To achieve its overall supply reliability objectives, by 2010 Metropolitan would need to supplement its deliveries from the SWP with 300 taf of water from Central Valley storage and transfer programs during critically dry years.

Metropolitan believes that it now has in place Central Valley storage and transfer programs capable of reaching this target, and it has several other programs under development. Because yields from individual programs can vary widely depending on hydrologic conditions and CVP/SWP operations, the dry-year yields for the various programs reported in this section are expected values only. In any given year, actual yields could depart from the expected values. Despite that uncertainty, Metropolitan's models of these programs indicate that in the aggregate, they can meet the 2010 resource target under a wide range of hydrologic conditions and CVP/SWP operations.

### **Changed Conditions**

Since the 2000 RUWMP, conditions affecting the development of Metropolitan's Central Valley storage and transfer programs have improved significantly. Metropolitan has dedicated more staff to identifying, developing, and implementing Central Valley storage and transfer programs. Such programs have served to demonstrate the value of partnering, and increasingly, Central Valley agricultural interests are viewing partnering with Metropolitan as a sensible business practice that is beneficial to their local district and regional economy. In addition, Metropolitan staff has demonstrated the ability to work with California Department of Water Resources and US Bureau of Reclamation staff to facilitate Central Valley storage and transfer programs. Taken together, these positive changes enabled Metropolitan to reach the 2010 resource target by 2003.

### **Implementation Approach**

Metropolitan currently has four Central Valley storage programs in operation that serve to increase the reliability of supplies received from the California Aqueduct. Metropolitan is also pursuing a new storage program with Mojave Water Agency, and it is currently under development. In addition, Metropolitan pursues Central Valley water transfers on an as needed basis. Table III-22 lists the expected yields from these programs. Figure III-5 shows the location within the Central Valley of each program listed in Table III-22.

### ***Semitropic and Arvin-Edison Storage Programs***

Metropolitan has entered into groundwater storage programs with Semitropic and Arvin-Edison Water Storage Districts, both of which are located in the southern part of the San Joaquin Valley. The combined storage of the two programs is approximately 600 taf. The specific amount of water Metropolitan can expect to receive from these programs depends upon hydrologic conditions and the demands placed on the Semitropic Program by other program participants. At full development, the storage programs can deliver 197 taf over 10 months. During wet years, Metropolitan has the discretion to use these programs to store portions of its SWP entitlement water that are in excess of the amounts needed to meet Metropolitan's service area demand. This water is either put in spreading basins or delivered to district farmers who use the water in-lieu of

pumping groundwater. During dry years, the districts return Metropolitan's previously stored water to Metropolitan.

**Table III-22**  
**CVP/SWP Storage and Transfer Programs: 2025**  
**(TAF)**

<b>Hydrology</b>	<b>Multiple Dry Years (1990-1992)</b>	<b>Single Dry Year (1977)</b>	<b>Average Year (1922-2004)</b>
<b>Current Programs<sup>1</sup></b>			
Semitropic Program	107	107	0
Arvin Edison Program	90	90	0
San Bernardino Valley MWD Program	37	70	20
Kern Delta Program	50	50	0
<b>Subtotal of Current Programs</b>	<b>284</b>	<b>317</b>	<b>20</b>
<b>Programs Under Development<sup>1</sup></b>			
Mojave Program <sup>2</sup>	35	35	0
Central Valley Transfer Programs	125	125	0
<b>Subtotal of Proposed Programs</b>	<b>160</b>	<b>160</b>	<b>0</b>
<b>Maximum Supply Capability</b>	<b>444</b>	<b>470</b>	<b>20</b>

Notes:

1. Central Valley Storage and Transfer Programs are shown in the California Aqueduct tables in Appendix A.3.

2. The Mojave Program is listed under development even though it already exists as a demonstration project because Metropolitan is investigating extending and expanding the program.

\* Appendix A.3 includes Central Valley Storage and Transfer Programs supply projections for 2010, 2015, and 2020.

### ***San Bernardino Valley MWD Storage Program***

This program can deliver between 20 taf and 80 taf in dry years, depending on hydrologic conditions. The expected delivery for a single dry year similar to 1977 is 70 taf. The agreement with San Bernardino Valley MWD also allows Metropolitan to store up to 50 taf of transfer water for use in dry years. In wet years the program can produce up to 130 taf of water supply.

### ***Kern-Delta Water District Storage Program***

This groundwater storage program has 250 taf of storage capacity. When fully developed, it will be capable of providing 50 taf of dry-year supply.

### ***Mojave Storage Program***

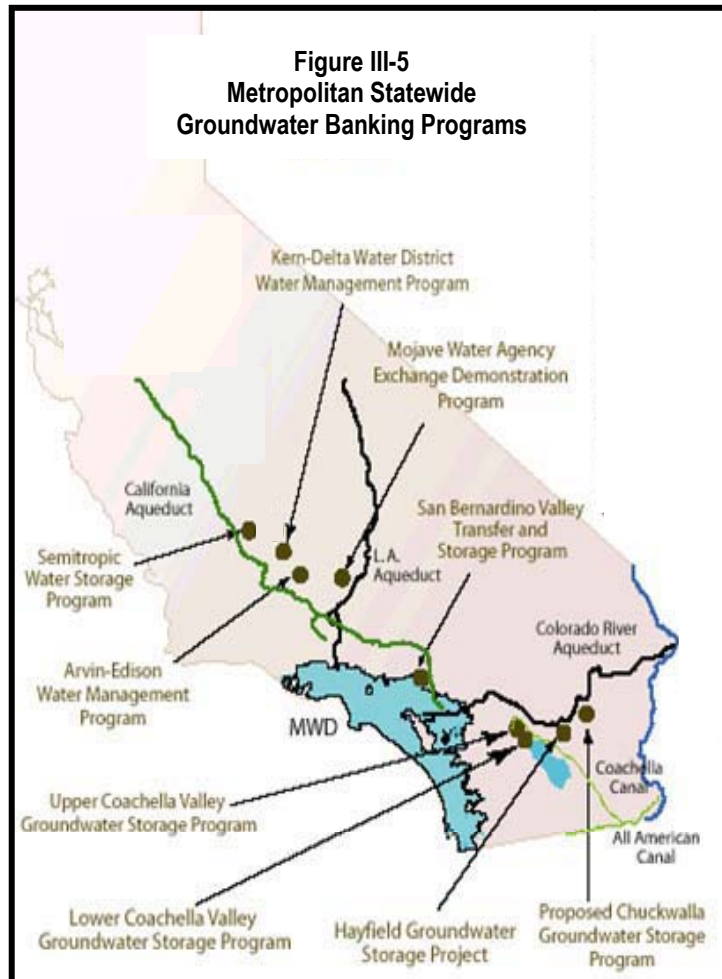
Currently operated as a demonstration program, Metropolitan plans to extend and expand this groundwater storage program. The program will store SWP supply delivered in wet years for

subsequent withdrawal during dry years. When fully developed, the program is expected to have a dry-year yield of 35 taf.

### ***Central Valley Transfer Programs***

Metropolitan expects to secure Central Valley water transfer supplies via spot markets and option contracts to meet its dry-year resource targets when necessary. Hydrologic and market conditions will determine the amount of water transfer activity occurring in any year. Transfer market activity in 2003 and 2005 provide examples of how Metropolitan has used water transfer options as a resource to fill anticipated supply shortfalls needed to meet Metropolitan's service area demands.

In 2003, Metropolitan secured options to purchase approximately 145 taf of water from willing sellers in the Sacramento Valley during the irrigation season. These options protected against potential shortages of up to 650 taf within Metropolitan's service area that might arise from a decrease in Colorado River supply or as a result of drier-than-expected hydrologic conditions. Using these options, Metropolitan purchased approximately 125 taf of water for delivery to the California Aqueduct.



In 2005, Metropolitan, in partnership with seven other State Water Contractors, secured options to purchase approximately 130 taf of water from willing sellers in the Sacramento Valley during the irrigation season, of which Metropolitan's share was 113 taf. Metropolitan also had the right to assume the options of the other State Water Contractors if they chose not to purchase the transfer water. Due to improved hydrologic conditions, Metropolitan and the other State Water Contractors did not purchase these options.

Metropolitan's water transfer activities in 2003 and 2005 have demonstrated Metropolitan's ability to develop and negotiate water transfer agreements working directly with the agricultural districts who are selling the water. In critically dry-years or periods of prolonged drought, Metropolitan also anticipates working closely with DWR, USBR, and other water users to implement statewide programs similar to the Drought Water Banks operated by DWR in the early 1990s. Such statewide programs have a potential to secure large volumes of transfer water.

For example, in 1991 DWR's Drought Water Bank secured over 800 taf of water transfer supplies within a short period from a limited group of sellers. Because of the complexity of cross-Delta transfers and the need to optimize the use of both CVP and SWP facilities, DWR and USBR are critical players in the water transfer process, especially when shortage conditions increase the general level of demand for transfers and amplify ecosystem and water quality issues associated with through-Delta conveyance of water. Therefore, Metropolitan views state-led programs to facilitate voluntary, market-based exchanges and sales of water as an important part of its overall water transfer strategy.

While the amount of water supply obtained through short-term transfer and storage programs is expected to vary year-to-year, Metropolitan's planning models indicate that on average these programs will yield about 125 taf for single and multiple dry-year scenarios.

### **Achievements to Date**

Metropolitan has made rapid progress to date developing Central Valley storage and transfer programs. Most notably, by 2003, it was able to put in place sufficient storage and transfer programs to meet its 2010 dry-year resource target of 300 taf. This rapid progress may be attributed to several factors, including Metropolitan dedicating additional staff to identify, develop, and implement Central Valley storage and transfer programs; increased willingness of Central Valley agricultural interests to enter into storage and transfer programs with Metropolitan; and Metropolitan staff's ability to work with California Department of Water Resources and US Bureau of Reclamation staff to facilitate Central Valley storage and transfer programs.

## III.7 COLORADO RIVER AQUEDUCT

### IRP Goals

In the 1996 IRP, Metropolitan adopted a target for supplies from the Colorado River Aqueduct (CRA) of 1.2 million af per year. Since that time, a number of constraints have developed that restrict Metropolitan's access to Colorado River supplies. As a result, Metropolitan's goals for Colorado River deliveries, and programs to attain the goals, have been changed from the previous IRP. The IRP Update adopted a revised policy of utilizing the fill capacity of the CRA when needed through the basic apportionment and various water banking and water transfer programs. This water will help Metropolitan manage regional storage conditions and water quality.

### System Description

Metropolitan was established to obtain an allotment of Colorado River water, and its first mission was to construct and operate the CRA. Under its contract with the federal government, Metropolitan has a basic entitlement of 550 taf per year of Colorado River water. Over time, however, this amount will be reduced slightly. Metropolitan also holds a priority for an additional 662 taf per year. Metropolitan can obtain water under this priority from:

- water unused by the California holders of priorities 1 through 3
- water conserved by the water conservation program with Imperial Irrigation District.
- water saved by the Palo Verde fallowing and forbearance program, or
- when the U.S. Secretary of the Interior determines that either one or both of the following exists:
  - surplus water;
  - water is apportioned to, but unused by, Arizona and/or Nevada.

### Issues

Over the years, a number of factors have affected the levels of Colorado River water available to Metropolitan.

- The 1964 U.S. Supreme Court decree in *Arizona v. California* reduced Metropolitan's dependable supply of Colorado River water to 550 taf per year. The reduction in dependability occurred with the commencement of Colorado River water deliveries to the Central Arizona Project in 1985.
- In 1979, the U.S. Supreme Court quantified present perfected rights (PPRs) to the use of Colorado River water by certain Indian reservations and other users. Since 1985, these PPR holders have used less than 20 taf annually. Because over 5.362 maf of Colorado River water were already allocated, it was not clear which rights would be affected by the use of these PPRs.

At that time, no formal guidelines existed to determine whether surplus water would be available. Decisions regarding surplus water availability were to be made at the discretion of the Secretary of

Interior. As a result, the issues surrounding Colorado River water rights remained the subject of disagreement and litigation for many years.

The following figure shows the major aqueducts within southern California including those from the Colorado River, and the entities within the state having rights to the use of more than 5.362 maf of water from the Colorado River.

Figure III-6



### Changed Conditions

Over time, Metropolitan and the State of California acknowledged that they would obtain less water from the Colorado River in the future than they had in the past, but the lack of clearly quantified water rights hindered efforts to promote water management projects. The U.S. Secretary of Interior asserted that California's users of Colorado River water had to limit their use to a total of 4.4 maf per year, plus any available surplus water. Under the auspices of the state's Colorado River Board, these users developed a draft approach to the problem, which was known as "California's Colorado River Water Use Plan" or the "California Plan." It characterized how California would develop a combination of programs to allow the state to limit its annual use of Colorado River water to 4.4 million af per year plus any available surplus water. The Quantification Settlement Agreement (QSA) among Imperial Irrigation District,

Coachella Valley Water District and Metropolitan is the critical component of the California Plan. It establishes the baseline water use for each of the agencies and facilitates the transfer of water from agricultural agencies to urban uses.

The recent extended drought in the Colorado River basin has stressed the water supply in this region more severely than had been foreseen. As a result of this experience, agencies from the Colorado River states are embarking on a negotiating process to develop guidelines to managing shortage on the Colorado River system. Until this process is completed (expected by December, 2007) the only guideline to allocations of this water is the existing priority system. Under this system, Metropolitan's base supply has higher priority than Arizona's or Nevada's supply, so Metropolitan has assumed (and current modeling demonstrates) that this supply is unlikely to be interrupted.

### **Implementation Approach**

The 1996 IRP recognized explicitly that program development would play an important part in reaching the target level of deliveries from the CRA and other Colorado River user service areas. The implementation approach explored a number of water conservation programs with water agencies that took water from the Colorado or were located in close proximity to the CRA. Implementing the QSA was a necessary first step for all of these programs. On October 10, 2003, after lengthy negotiations, representatives from Metropolitan, the Imperial Irrigation District (IID), and Coachella Valley Water District (CVWD) executed the QSA and other related agreements. Parties involved also included the San Diego County Water Authority (SDCWA), the California Department of Water Resources (DWR), the California Department of Fish and Game, the U.S. Department of the Interior, and the San Luis Rey Indian Water Rights Settlement Parties.

Metropolitan has identified a number of programs that could be used to achieve the regional long-term development targets for the CRA, and it has entered into or is exploring agreements with a number of agencies. Table III-23 summarizes these programs and describes whether the programs are being implemented, are deferred, or under investigation.

**Table III-23**  
**Colorado River Aqueduct Deliveries: 2025**  
**(TAF)**

<b>Hydrology</b>	<b>Multiple Dry Years (1990-92)</b>	<b>Single Dry Year (1977)</b>	<b>Average Year (1922-2004)</b>
<u>Existing Projects</u>			
Base Apportionment <sup>1</sup>	503	503	503
IID/MWD Conservation Program	85	85	85
PVID Land Management Program	110	110	110
<u>Future Projects</u>			
Hayfield Storage Program <sup>3,4</sup>	100	100	0
Lower Coachella Storage Program <sup>4</sup>	150	150	0
Chuckwalla Storage Program <sup>4</sup>	150	150	0
Storage in Lake Mead <sup>5</sup>			

<sup>1</sup> Basic apportionment less Present Perfected Rights.

<sup>2</sup> While conserved water from these programs is allocated to SDCWA and the San Luis Rey Settlement Parties, the water is made available at Lake Havasu for diversion by Metropolitan. By exchange, Metropolitan provides an equal volume to those parties at the terminus of its facilities in San Diego County.

<sup>3</sup> Program has been implemented with approximately 73 taf in storage, and construction of extraction facilities was started but then deferred for two years because of drought in the Colorado River basin.

<sup>4</sup> Storage programs have been deferred pending greater availability of surplus on the Colorado River.

<sup>5</sup> Under investigation

### ***Colorado River Water Management Programs***

#### **IID/MWD Conservation Program**

Under a 1988 agreement, Metropolitan has funded water efficiency improvements within IID's service area in return for the right to divert the water conserved by those investments. Under this program, IID implemented a number of structural and non-structural measures, including the lining of existing earthen canals with concrete, constructing local reservoirs and spill-interceptor canals, installing non-leak gates, and automating the distribution system. Other implemented programs include the delivery of water to farmers on a 12-hour rather than a 24-hour basis and improvements in on-farm water management through the installation of tailwater pumpback systems, drip irrigation systems, and linear-move irrigation systems. Through this program, Metropolitan initially obtained an additional 109 taf per year. Execution of the QSA and amendments to the 1988 and 1989 agreements resulted in changes in the availability of water under the program, extending the term to 2078 and guaranteeing Metropolitan at least 80 taf per year. The remainder of the conserved water is available to CVWD.

#### **Palo Verde Land Management and Crop Rotation Program**

In May 2004, Metropolitan's Board authorized a 35-year land management, crop rotation, and water supply program with the Palo Verde Irrigation District. Under the program, participating farmers in PVID will be paid to reduce their water use by not irrigating a portion of their land. A maximum of 29 percent of lands within PVID can be fallowed in any given year. Under the

terms of the QSA, water savings within the PVID service area will be made available to Metropolitan. Partial implementation of the program began in January 2005, with deliveries in that year of 85 taf. When fully implemented, the program is estimated to provide up to 111 taf per year. The agreement also states that when fully implemented the program will supply a minimum of 26 taf per year.

#### Hayfield Groundwater Storage Program

Metropolitan's board approved the Hayfield Groundwater Storage Program in June 2000. The program will allow CRA water to be stored in the Hayfield Groundwater Basin in east Riverside County (about 50 miles east of Palm Springs) for future withdrawal and delivery to the CRA. As of 2003, there were 73 taf in storage. At that time, construction of facilities for extracting the stored water began, but it was then deferred for two years because drought conditions in the Colorado River watershed resulted in a lack of surplus supplies for storage. When the drought ends, Metropolitan will pursue this program and develop storage capacity of about 500 taf.

#### Chuckwalla Groundwater Storage Program

Under this proposed program, Colorado River water would be stored in the Upper Chuckwalla Groundwater Basin for future delivery to the CRA. The basin is located in Riverside County about 70 miles east of Palm Springs. Metropolitan has also decided to defer this program until water becomes more plentiful in the Colorado River Basin.

#### Lower Coachella Valley Groundwater Storage Program

Metropolitan, the Coachella Valley Water District, and the Desert Water Agency are investigating the feasibility of a conjunctive use storage program in the Lower Coachella groundwater basin. The basin, which is currently in an over-drafted condition, has the potential to provide a total storage capacity of 500 taf for Metropolitan. The Lower Coachella Program would have the advantage of using the All American and Coachella canals to deliver water for storage, preserving capacity in the CRA for service area demands.

The groundwater storage programs (Hayfield, Chuckwalla and Lower Coachella) all depend on the availability of surplus water supplies from the Colorado. This water could come from a number of sources: when supplies above 4.4 maf are available for California use; when other California agencies use less than their allotted CRA water supplies; or if Metropolitan were to obtain water transfers from agencies in other Colorado River states. However, the recent drought in the Colorado River basin means that little additional water is likely to be available from these sources in the immediate future, so Metropolitan has deferred future expenditures on these programs until surplus water is more likely to be available.

#### Salton Sea Restoration Transfer

State legislation passed in 2003 requires the development of a plan to restore the Salton Sea. The Resources Secretary is required to submit to the Legislature a plan that identifies a preferred alternative no later than December 31, 2006. Implementation of the plan would be funded from the Salton Sea Restoration Fund (Restoration Fund). Part of the income to the Restoration Fund would include the proceeds from a DWR-facilitated transfer of IID conserved water to Metropolitan.

This transfer would consist of up to 1.6 million af of water that would be conserved by IID and made available to Metropolitan with the net proceeds being placed in the Restoration Fund.

DWR is to help facilitate the transfer. This potential transfer is composed of two blocks of water: (1) 800 taf new water to be conserved by IID; and (2) 800 taf of water presently scheduled to be conserved by IID under the QSA to provide salinity management water for the Salton Sea. Conserved water could be available as soon as 2007 through 2017.

DWR is in the initial stages of preparing a Program Environmental Impact Report (PEIR) for the plan. A Draft PEIR is scheduled for release to the public in December 2005. The Final PEIR is scheduled for release in November 2006 with a Notice of Determination to be filed in December 2006. Metropolitan expects to call on this water in the medium term (around 2010), but does not expect to rely on it in the long term.

#### Lake Mead Storage

Metropolitan is also exploring other options for water storage including the potential to store water in Lake Mead. While this project appears promising, the likely benefits are too speculative to include in the reliability analysis.

#### **Achievements to Date**

Metropolitan recognizes that in the short-term, programs are not yet in place to provide the full target, even with the adoption of the QSA. The QSA provides a solid foundation for developing future programs that will help accomplish the long-term CRA target.

The execution of the QSA also reinstated the Interim Surplus Guidelines (ISG), which were suspended when the original agreement deadline passed. Under these guidelines, California can receive any surplus water available from the river through 2016. The amount of water available under this program would vary from year to year depending on the amount of water in storage in Lake Mead. Because of a five-year drought in the Colorado River watershed, the amount of surplus water available to Metropolitan has been substantially reduced from earlier projections. Additionally, if Metropolitan chooses to divert any special surplus water, a shortage-sharing program with the State of Arizona may be necessary. Because of the risks associated with this shortage-sharing, Metropolitan did not divert the special surplus water that was available through the ISG in 2003 or 2004. No surplus water is available in 2005.

Because of the uncertainties associated with this supply source, Metropolitan's current plans for resource development do not rely on them and the program is not included in this regional plan. However, this source may become more useful in future.